# INDIA
# THEN AND NOW

BY
C. A. PARKHURST

MACMILLAN AND CO., LIMITED
CALCUTTA, BOMBAY, MADRAS AND LONDON

TO

MY MOTHER



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## AUTHOR'S NOTE

The author's *Wonders of the Past and Present* has proved to be such a success that he has been emboldened to embark upon the writing of *India—Then and Now.* He makes no apologies for such a book.

Its aim is to give information about the India of the past and the present, and to instil in the minds of Indian students pride in the accomplishments of their forefathers as well as of their contemporaries.

Some say that pride is a sin, but it is surely no sin to be proud of one's country and its past achievements. A very bright future lies before the India of to-day and of to-morrow. Our students should be well-versed in the past and in the present, so that they may take advantage of such knowledge and occupy their rightful place in the future development of their country.

The author wishes to acknowledge his great indebtedness to the Bureau of Public Information, Government of India, New Delhi, for supplying many of the pictures used in this book ; to the Director of All-India Radio, New Delhi, for kind permission to reproduce photographs and information about A. I. R. ; to the Central Publicity Officer, Indian State Railways (E. I. Ry.), for photographs and permission to reproduce them ; to the National Tobacco Co. of India

Ltd., for a photograph and permission to reproduce the same; to the Editor of *Phoenix* for the excellent picture of Howrah Bridge; to the Scindia Steam Navigation Co., for pictures and valuable information regarding Indian Shipping; and to Mr. G. L. W. Moss of the Dunlop Rubber Co. (India) Ltd., for pictures and information about the manufacture of rubber tyres.

Last, but not least, the author offers his sincere thanks to Mr. Thomas Mark of London, for finding the time to go through the manuscript and for his very valuable suggestions and improvements.

C. A. P.

## FOREWORD

In olden days Europeans had some wonderful ideas about India. People spoke of the " Wealth of the Indies " to express the very height of riches and splendour. Poets describe " the Gorgeous East " as decked with pearls and gold. It was a tradition of the West that the Orient, especially India, was a favoured region, a second heaven on earth, where the costliest clothes were worn, the choicest food and fruits were eaten, where every luxury was to be had for the taking, a land of kings of unbounded wealth, and queens of marvellous beauty. Few of the Western folk can ever have dreamed that in India there were millions of poor people even as in their own lands.

Who was responsible for these ideas of Eastern magnificence ? Perhaps, after all, there was some reason for them. The civilizations of the East were very ancient. They had had the time and the resources to create many wonderful things that the younger and smaller nations of the West did not possess. The Greeks and the Romans heard about them from their learned men. Then, centuries later, a few Europeans travelled across Asia Minor and Persia in order to visit India, the land of their dreams, and see its marvels for themselves. Marco Polo, Manucci, Tavernier, Bernier and others came back with wonderful tales of princes and princesses, jewels and fine muslins. Some tried to

describe the lives of the ordinary people but they were not very successful. It was not till Vasco da Gama discovered the way to India by sea that Europeans began to come to our country in larger numbers. Most of them were merchants eager to exchange their goods at high prices for its gold and jewels and beautiful fabrics. Others were officials and soldiers in the pay of the trading companies of the various nations. These companies soon became semi-government concerns, anxious to further the interests of their particular nations. Most of the merchant-officials were chiefly concerned to add to their own wealth until they were in a position to pack up and leave the East for good. There is some reason for feeling that such people did not care very much for the history of this ancient land or the manners and customs of the people. Neither did they realise the great mineral resources which exist in this vast sub-continent. On the other hand we must remember that some rulers did not allow Europeans to go far outside their trading centres. A few of them, however, did study the religions and history of Hindustan, and wrote valuable books about them. Some of them lived and died in India, and their children also followed their example.

Thus in course of time a more truthful account of India began to reach Europe. To this day, however, a good general knowledge of India is not very common anywhere. Even many of the people of India itself

do not know much of its past history or present opportunites. When it comes to looking into the future they do not show much imagination. It is therefore the school boys and school girls of to-day who must take an intelligent interest in the country of their birth and try to visualise the brilliant future in store for it and for themselves.

As no one can deny that the world is fast becoming more and more technical and scientific in its thoughts and actions, we shall do well to study present-day life in our native land, and its position in the past. If we do so, we shall perhaps learn much that will help us in our own particular lives and in the part we play in the development of India's commerce, trade, and general welfare. As we read of our country's great achievements and resources, we shall realise what splendid opportunities she offers to any one of ability and enterprise. This does not mean we should exclude helpers of good will. We have much to learn from their methods and experience. But do let us try and stand on our own legs.

That is one of the purposes behind the brief account of some aspects of our country's cultural, industrial and other activities in the past as well as in the present. Now that India has gained her independence and is free she will take her proper place in the world and go from strength to strength.

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# INDUSTRIES—THEN AND NOW.

## PART I.

MANY people, both in the East and the West, think that India has always been a purely agricultural country, and was never interested in industry.

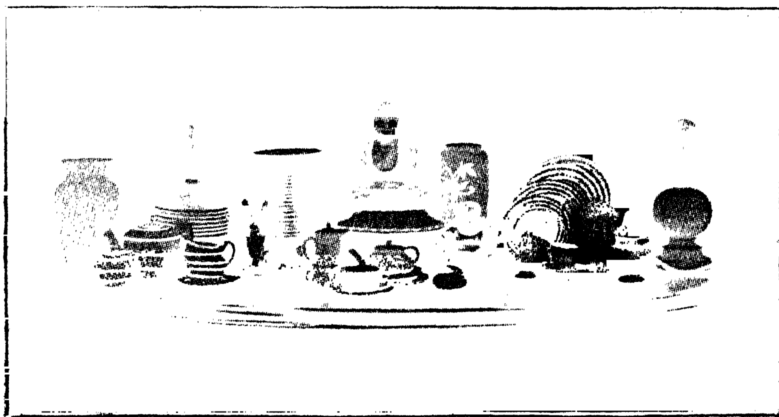
Instead of telling you at once about the things which were manufactured in India in olden days without interfering with her agriculture, it will be better to put the whole thing in a nutshell, as it were, and give you quotations from the writings of four distinguished people, three Europeans and one Indian. They put the matter quite clearly and simply.

Montgomery Martin, writing about a century ago, said : "India is as much a manufacturing country as an agricultural one, and he who would seek to reduce her to the position of an agricultural country seeks to lower her in the scale of civilization. She is a manufacturing country, her manufactures of various descriptions have existed for ages, and have never been able to be competed with by any nation wherever fair play has been given to them. I speak now not of her Dacca muslins and Cashmere shawls, but of various articles which she has manufactured in a manner superior to any part of the World."

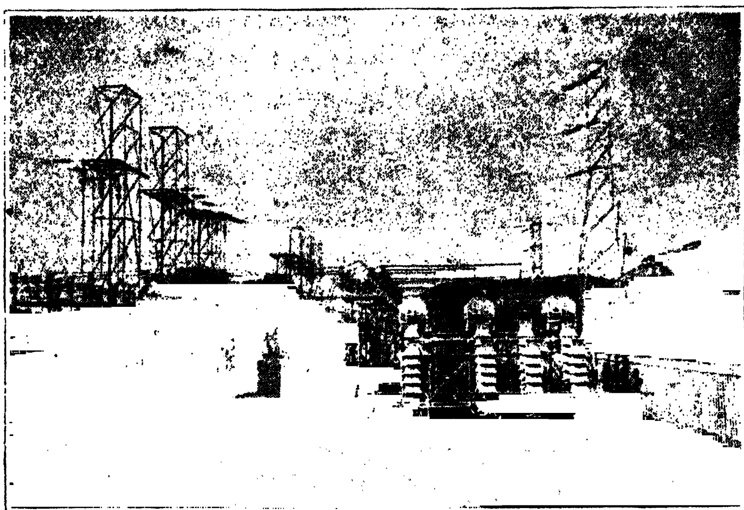
Later, in the nineteenth century, the great philosopher and Sanskrit scholar, Professor Max Muller,

wrote: " If I were to look over the whole world to find the country most richly endowed with all the wealth, power and beauty that nature can bestow, in some parts a very paradise on earth—I shall point to India."

Another writer of the last century, Edward Thornton, said : " Ere the Pyramids looked down upon the valley of the Nile, when Greece and Italy, those cradles of European civilization, nursed only the tenants of the wilderness, India was the seat of wealth and grandeur. A busy population had covered the land with the marks of industry ; rich crops of the most coveted productions of nature annually rewarded the toil of the husbandmen. Skilled artisans converted the crude products of the soil into fabrics of unrivalled delicacy and beauty. Architects and sculptors joined in con-



SOME OF GWALIOR'S BEAUTIFUL POTTERY



A HUNDRED THOUSAND VOLT OUTDOOR SWITCH YARD AT THE POWER HOUSE OF AN INDIAN HYDRO-ELECTRIC SYSTEM

structucting works, the solidity of which has not, in some instances, been overcome by the evolution of thousands of years. The ancient state of India must have been one of extraordinary magnificence."

Last, but not least, we come to Dr. Shyamaprasad Mookerjee, who writes as follows :

"Nearly every kind of manufacture or product known to the civilized world—nearly every kind of creation of Man's brain and hand, existing anywhere, and prized either for its utility or beauty—had long been produced in India. India was a far greater industrial and manufacturing nation than any in Europe or than any other in Asia. Her textile goods—the fine

products of her looms, in cotton, wool, linen, and silk were famous over the civilized world ; so were her exquisite jewellery and her precious stones cut in every lovely form ; so were her pottery, porcelains, ceramics of every kind, quality, colour, and beautiful shape ; so were her fine works in metal—iron, steel, silver and gold. She had great architecture, equal in beauty to any in the world. She had great engineering works. She had great merchants, great business men, great bankers and financiers. Not only was she the greatest ship-building nation, but she had great commerce and trade by land and sea which extended to all known civilized countries.

"It is wrong to assert that India has been mainly an agricultural country. Not only was she industrially rich, but she sent out materials and finished goods to other parts of the world. Her steel furnished the materials out of which Damascus blades with a world-wide reputation were made, and it paid Persian merchants in those old times to travel all the way to India to obtain these materials and export them to other countries. Indian steel found considerable demand in cutlery in England. The manufacture of steel and wrought iron had reached high perfection at least 2500 years ago."

Now these four eminent men have told you, more eloquently than we can ever hope to do, what was the position of this country in the past.

Man-power is one of the necessary resources for industries, and in India we have it in abundance. But the mere possession of man-power is not enough. The



A MICA MINER EASING OUT A 'BOOK' OF MICA

ordinary man in the street, who may have never been to school like us, cannot be put straight away into a workshop or factory. He has to be trained by others

who know exactly what to teach him. After you have got your trained man-power, you want something else to run your factories and workshops, that is, motive power. One great source of this is coal. Coal engenders heat, and so gives us steam, without which few industries can get along. We have very large deposits of coal in India, and it is natural for factories and iron and steel works to be established near them. The places that have no supplies of coal have to get it from the coalfields, and unless the transport charges are reasonable, the industries will be run at a disadvantage.

Another source of power is water, which is a means



MICA BEING CUT TO THE REQUIRED SHAPE BY WOMEN AND CHILDREN



CLEANING UP THE BODIES OF PASSENGER MOTOR CARS BUILT IN INDIA BY GENERAL MOTORS LTD.

of generating electricity. Although the hydro-electric works scattered throughout our country are very costly to erect, the charges made for the use of power which they generate must be kept low.

Now it is useless having plenty of coal and a supply of electricity if there is no iron ore near at hand. In our country we are fortunate in this respect, for not only is our iron ore nearly the best in the world, but other essential minerals are found alongside it. These are tungsten, chromium, cobalt, and manganese, all materials of great use in making iron and steel articles.

In Bihar we have the largest deposits of mica in the

world. Mica is extracted from open quarries in the form of 'books.' In dressing mica, the 'books' are spilt into sheets of required thicknesses and the sheets trimmed into rectangular pieces, stained and damaged portions being rejected. The dressed sheets are sorted out according to size, transparency, colour and freedom from spots or stains. Scrap mica is used in the manufacture of micanite. A non-conductor of heat and electricity, mica is of great importance in electrical industries.

Then there are large deposits of mineral oil in the Punjab and at Digboi in Assam.

Now that motor cars and aeroplanes are being built by Indian labour in Indian factories, we can be certain that the success of our industries is assured, because motor vehicles and aeroplanes are, or will be, indispensable to the life and labour of the modern world.

In starting such modern enterprises, Indian business men have not committed the fault of ignoring the skilled workmen of other countries. Our workmen must first be taught by others well able to instruct them, and so we should welcome such assistance from outside.

There can be no doubt that a great awakening of Indian industries is taking place. In order to cope with it skilled men are required, and required urgently. Many young Indians have been sent to England to live with the workers there, and to learn



INDIAN STUDENTS GARLAND MANCHESTER'S LORD MAYOR

all they can about various kinds of industries and engineering methods. They go to England in batches and return home after they have finished their training. They are then qualified to accept well-paid and responsible jobs which are offered to them by great industrial firms in India. They are all enthusiastic about the reception they got from their fellow-workers in England, and many lasting friendships have been made. They also saw with their own eyes how the average Englishman lives in his own land.

Let us now pass on to Part Two of this lesson, and learn some details about our industries.

## QUESTIONS

1. Give a brief account of the articles manufactured ir India in ancient days.

2. Write what you know about the "cradles of Europear civilization."

3. What do you think of our boys being given technica training in England?

## NOTES

**porcelain** : the finest kind of earthenware ; chinaware.
**ceramics** : pottery ; things made of baked clay.
**cutlery** : cutting instruments ; knives, etc.
**motive power** : that which produces motion—such as electricity, steam, etc.
**engender** : to produce ; to bring into being.
**hydro-electric** : electricity developed by water-power.
**tungsten** : a brittle grayish metal of the chromium group, alsc called wolfram, used in making steel.
**cobalt** : a steel-gray metallic element resembling nickel.



# INDUSTRIES—THEN AND NOW.

## PART II.

To have successful industries we must first of all have plenty of raw materials with which to run them.

India is very rich in minerals. Gold, silver, lead, iron, manganese, coal, salt, mica, and bauxite are some of her mineral treasures. But the most wonderful thing is that no one has the slightest idea as to the quantities that are available in this country, or the number of other minerals that are still awaiting discovery.* It is said that in the Central Provinces alone there are underground treasures exceeding in value many thousands of times the traditional "king's ransom." When you come to study the matter with the aid of a map, you will discover, even near deposits of minerals that have long been known and worked, very large tracts of land which have never felt the labourer's spade or the mechanical excavator.

The coalfields of Bengal and Bihar are the richest in India, and, as you have read in the previous lesson, other minerals such as iron ore and many materials of great use in the making of steel are found near at hand. The excellence of ancient Indian armour may be judged from the superb collections that are to be found in different parts of our country.

Sir Goerge Watt says that there would seem to be



PACKING SALT INTO BAGS, SAMBAR LAKE

no doubt that the existing manufacture of wrought iron by a direct process was widespread in India before the date of the most ancient historical records, while the manufacture of the ancient *wootz* anticipated by many centuries the cementation process developed in Europe for the manufacture of the finest steel. Writing about some iron furnaces in the village of Deocha, Valentine Ball, in his *Jungle Life in India*, says "To the best of my belief these furnaces are, for their size and the magnitude of their results, by far the largest and most important in the whole of India. Each furnace could make about fifteen cwts of iron per week; and the total estimated outturn in 1852 from seventy of these furnaces was put down at 1700 tons."

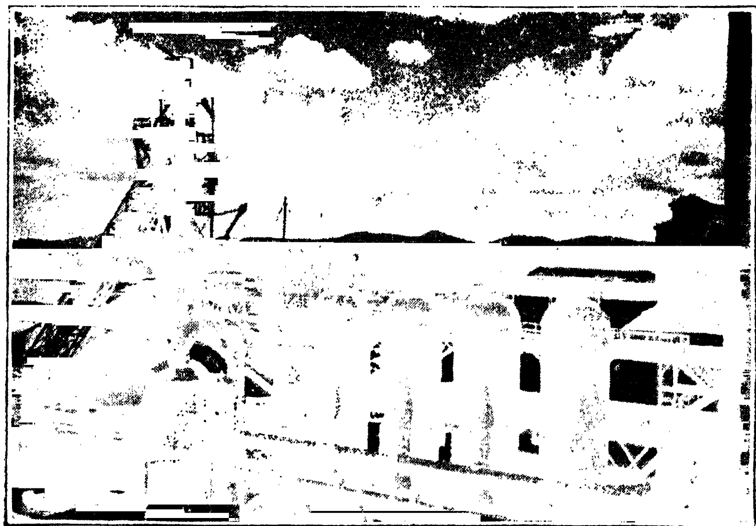


[*Photo : C. A. P.*

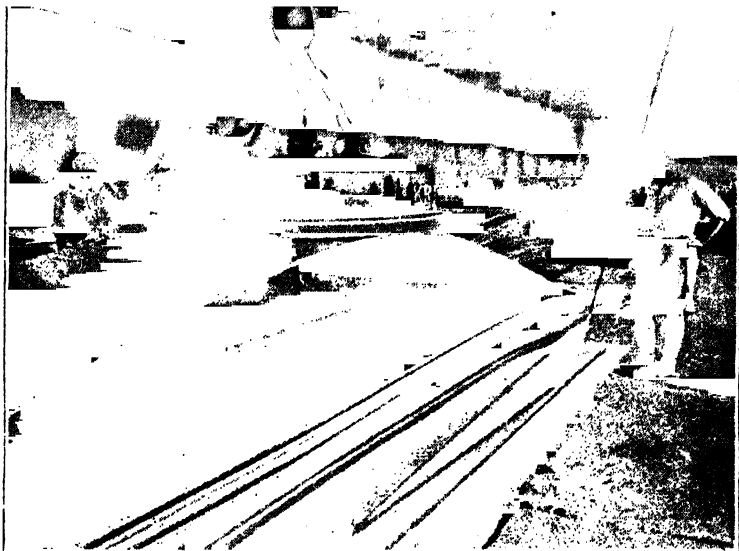
IRON PILLAR NEAR THE KUTB MINAR, DELHI

The famous iron pillar near the Kutb Minar at Delhi, proves the technical knowledge of our forefathers. It is estimated to be at least 1500 years old. Very great skill must have been exercised in welding and shaping this pillar ; it is more than 23 ft. high and weighs about six tons.

In these modern days we have the steel works of the Tatas at Jamshedpur, the town named after the famous Parsee who exploited the vast iron deposits and started the great industry there. At night the whole place is a blaze of light. The huge furnaces work night and day to produce thousands of tons of steel.

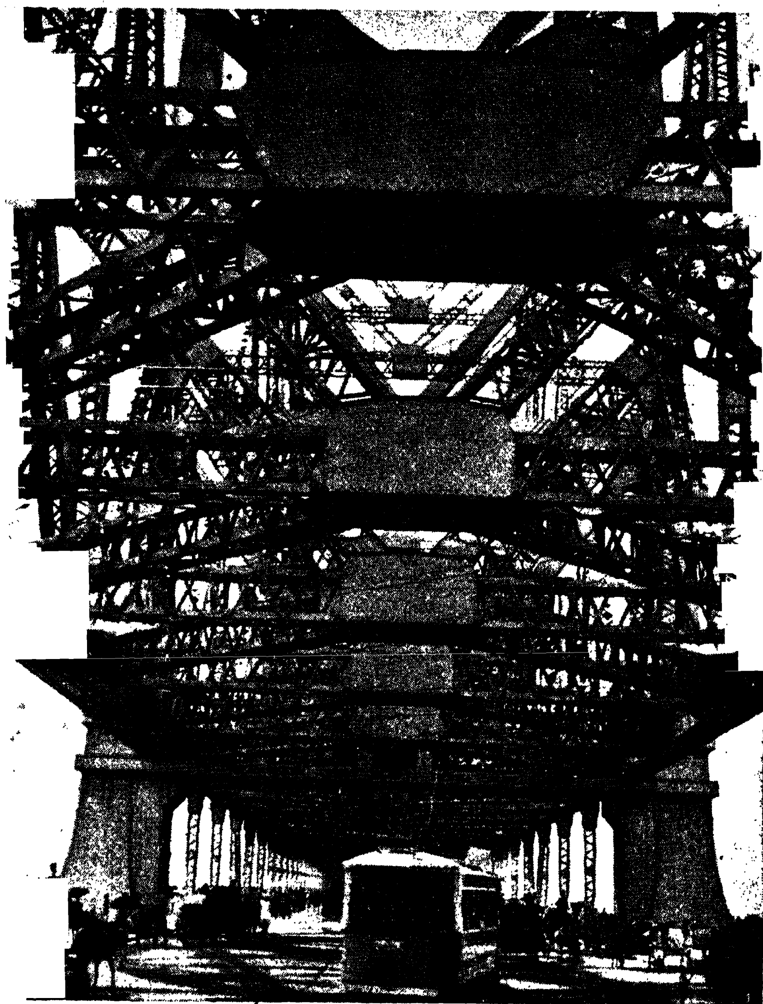


ONE OF OUR IRON AND STEEL WORKS



ELECTRIC MAGNET LIFTING STEEL PLATES

The red hot molten metal is poured into open hearth furnaces holding three hundred tons. The steel when finished is poured into iron moulds. When the metal becomes sufficiently cool, it is taken out of the moulds in the form of ingots. The ingots are then put into soaking pits so that they may be heated to the proper temperature for the purpose of rolling them into shape. When the plates or sheets emerge from the rolling machine they are lifted on to trucks by means of electric magnets. Is that not a wonderful application of an ordinary everyday scientific fact ?



HOWRAH BRIDGE

*With acknowledgments to the Editor of Phoenix.*

We play with magnets, but think what power must be required to lift a huge piece of steel!

Agricultural and jute machinery, armoured plates for the ships of the Royal Indian Navy, parts for locomotives, girders for bridges, and many other things made of iron and steel are manufactured at Tatas. Nearly all the steel used in the Howrah Bridge in Calcutta came from Tatas, and that bridge is the third largest cantilever bridge in the world!

The development of the chemical industry has not kept pace with the huge requirements of India's growing industries. This is evident from the large quantities of chemicals which were imported until just a few years ago. Our commerical men have now realised the importance of the chemical industry as a means of helping forward the other industries of the country. As very few chemicals could be obtained from abroad during the war, our scientists had to show their skill in finding ways to manufacture those same chemicals here.

The chemical industry is not new to India. The ancient Hindus possessed a fair knowledge of chemistry, mineralogy and metallurgy. Many chemicals which are now used everyday were manufactured in India in former times. Alum, nitre, salpetre, and other chemicals required for tanning, artificial manure, glass making, and paper making were only a few of them. The metallurgical trades were at one time in a very flourishing state, as is proved by the

casting of iron pillars, guns, jewellery and domestic utensils,—things which have all withstood the ravages of time for generations.

Another great industry which needs chemicals is agriculture. The minerals removed from the soil by the crops have to be replaced, otherwise future crops will not be a success and they will give poor yields. Hence potash, nitrogenous compounds, lime and phosphates are essential. Our chemists are busy manufacturing all these chemicals so that the farmers may have all that is necessary in the way of artificial manure at their doors without having to rely on foreign fertilizers.

We have read about the iron, steel, and chemical industries, and now there is a new one which claims our attention. It is the aluminium industry. It has a splendid future in India. There are large deposits of bauxite, from which aluminium is extracted, in the Bombay Presidency, the Central Provinces and Bihar. Before the war the raw material was shipped abroad, and foreign firms, who might be our trade rivals, extracted the aluminium and returned it to us in sheet form. Now there is a smelting plant in South India, where aluminium was first extracted from bauxite on 10th July 1944, and there are also large rolling mills in Bengal where many articles are manufactured. India has great supplies of the raw material, and a large market for the finished articles.



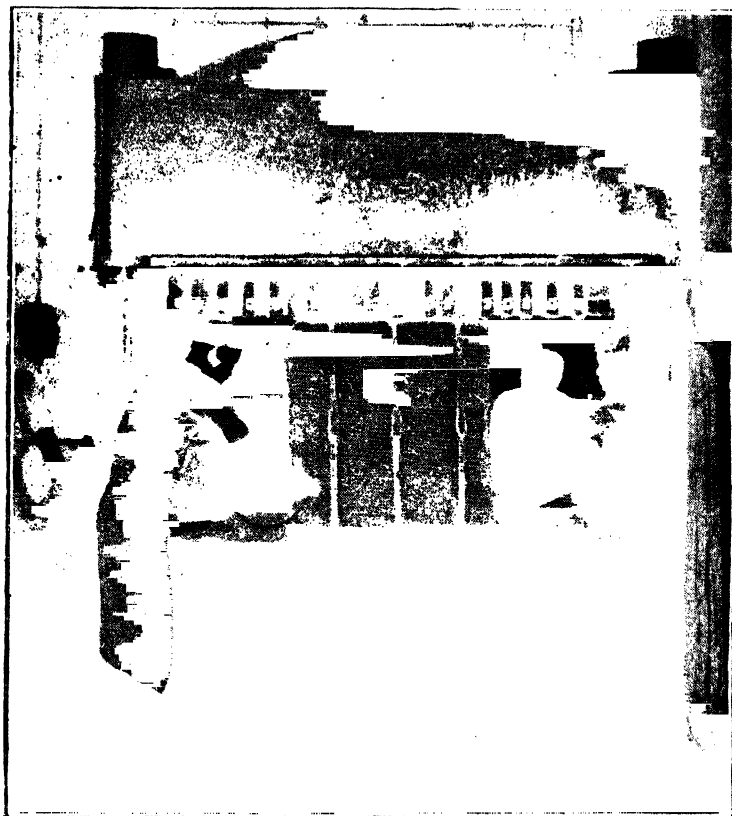
A BAUXITE MINE

The first three centuries of the Christian era were a period of great prosperity in India. Indian merchandise was carried to China in the East and to Rome in the West. India exported precious stones, pearls, spices, cotton, silk, muslins, and calicoes, and in return she received gold and linen. Our countrymen of those days were experts in the arts of weaving and spinning. Read what Tavernier, the traveller of Mughal times, says : "There is a considerable trade in cotton goods in this town of Burhanpur in Central India. An enormous quantity of transparent muslins are made, which are exported to Persia, Turkey, Muscovy, Poland, Arabia, Grand Cairo and other places. Some of these muslins are dyed various colours and ornamented with flowers. There are other fabrics which are allowed to remain white, with a stripe or two of gold or silver running the whole length of the piece, and at each of the ends, from the breadth of one inch up to twelve or fifteen, some more and in others less—it is a tissue



JEAN BAPTISTE TAVERNIER

of gold, silver and of silk with flowers, and there is no reverse, one side being as beautiful as the other. If those which they export to Poland, where they are in great demand, have not at both ends at least three or four inches of gold or silver, or if this gold and silver becomes black when crossing the ocean between Surat



STITCHING UP A BALE OF CLOTH AFTER PRESSING

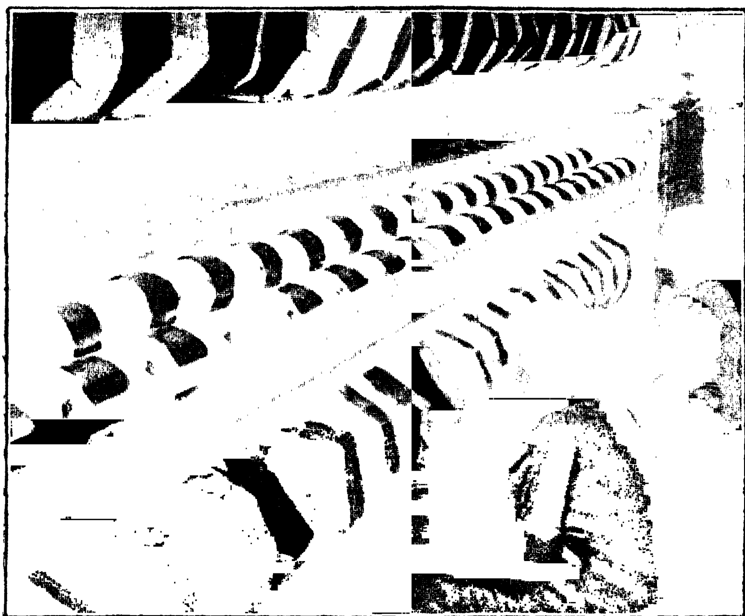
and Hormuz, and from Trebizonde to other parts of the Black Sea, the merchant cannot dispose of them except at great loss. He ought to take care that the goods are well packed, and that they are secured from damp ; this, for so long a voyage, requires much care and trouble. . ."

In olden days nearly every rural house had a spinning wheel or *charkha* as it is called, and enough yarn was spun on it for the whole household by its inmates. In our own times there has been a great revival of home spinning. Although the cloth which is produced from the yarn is coarse and rough to the touch, still it answers its purpose. Nowadays there are very large cotton mills in many parts of India, and they turn out millions of yards of cloth suitable for dhoties, sarees, etc.

You will read about the cultivation of cotton in the lesson on Agriculture. There you will also read about jute, which is grown largely in East Bengal. It is a huge industry and there are hundreds of jute mills in and around Calcutta where many thousands of workers are busy weaving the jute into hessians or gunny, as some people call this material. Other textiles being manufactured in large quantities in our country are silk and wool.

There is, as we have said, still plenty of silk being manufactured in India, but not so much as in olden days. Just before the war a new commodity was

rapidly taking its place. We refer to rayon or artificial silk. It is made from cellulose which is extracted from a variety of things such as wood, bamboo pulp, grass, soya bean husks, and many vegetable materials. Most of the rayon fabric used to be imported from Japan, but its production in India was making rapid headway. There were over thirty rayon mills in Bombay City as well as mills in Amritsar, Ludhiana, Calcutta, Ahmedabad, and other towns. These mills gave employment to about 50,000 workers and produced nearly a hundred million yards of rayon *fabric.*



GRAY RAYON YARN BEING WOUND FROM HANKS TO BOBBINS

This was all very promising for the future, but unfortunately the Second World War upset matters. No rayon *yarn* had been manufactured in India, and as most of it was imported from Italy, Japan and other European countires, the production of rayon fabric and cloth had to cease. In the meantime experiments have been carried on in New Delhi, and scientists hope that the manufacture of rayon yarn in India will soon be an accomplished fact.

Now what about our cottage industries? We should not forget the important part they have played in the past economic prosperity of our country and the possibilities they hold for the future. They have given employment to thousands of landless labourers, and helped to occupy the time of many others who depend only partially on agriculture for a living.

The muslins of Dacca, the silk embroidery and ivory work of Murshidabad, the chichon work of Hooghly and the Twenty-four Parganas, the gold embroidery and pottery work of Delhi, the leather articles of Madras, the filigree work of Orissa, the *papier maché* articles and woodwork of Kashmir are the products of only a few of the cottage industries carried on in India in the past as well as to-day. These artistic creations which involve the most delicate and dexterous work with the hands and fingers, were made with the aid of very simple appliances of local origin. *Beedi* making is also an important cottage industry. As you know *beedis*



BEEDI-MAKERS AT WORK

are a kind of cigarette in which the tobacco is enclosed in leaves instead of paper. Many thousands of men and boys are engaged in making them.

Another ancient cottage industry of India is the art of paper making. The advent of machines for paper making naturally caused this important cottage industry to practically disappear, but the war helped to revive it. It provides a living for many hundreds of workers. This paper is strong and reliable, but of course is not fine enough for printing work. In the picture you see the worker placing the wet sheets on top of one another after which the water is squeezed out.

Mr. George C. M. Birdwood gives a picturesque

description of village activities : "Outside the entrance of the single village street, on an exposed rise of



PAPER-MAKING BY HAND

ground, the hereditary potter sits by his wheel, moulding the swift revolving clay by the natural curves of his hands. At the back of the houses, which form the low irregular street, there are two or three looms at work in blue, scarlet, and gold, the frames hanging between the acacia trees, the yellow flowers of which drop fast on the webs as they are being woven. In the street the brass and copper-smiths are hammering away at their pots and pans ; and further down, in the verandah of the rich man's house, is the jeweller working rupees and gold mohurs into fair jewellery, gold and silver ear-

rings, round tires like the moon, bracelets and tinkling ornaments for the feet, taking his designs from the fruits and flowers around him, or from the traditional forms represented in the paintings and carving of the great temple, which rises over the grove of mangoes and palms at the end of the street above the lotus-covered village tank."

Unfortunately the children of the famous makers of muslins, silks and other lovely things did not all inherit their fathers' skill. Many of them returned to the tilling of the land, and others went to work in the mills of the big cities.



VILLAGE MEN WEAVING



A GOLD EMBROIDERY WORKER, DELHI

The reasons which have caused the ruin of these indigenous industries are many and varied. Competition with the foreign mill manufactures is one of the main causes, and the continuance of old-fashioned and unbusinesslike methods has also largely contributed to this regrettable decline in cottage industries.

India must bring her lost industries back to life and she must also find new avenues for the employment of her children. Those who have eyes to see can dis-

cern a great awakening in the field of cottage industries. We must realise that antiquated methods will not do, and that publicity (advertising) certainly does pay. Cottage workers would be well advised to start once again the manufacture of artistic and hard wearing articles which are in daily demand. The possibilities of such industries are great, and they could be sure of earning enough to keep their families from want. With careful investment and management India's cottage industries will increase and flourish, and the fame of old days will return.

## QUESTIONS

1. Make a list of the minerals of India and say where they are found.
2. Give the names of famous bridges in India that you have heard of.
3. Give a list of useful articles made out of aluminium.
4. State briefly where are the following places : Muscovy, Grand Cairo and Poland.
5. What would you do to improve the cottage industries of India ?

## NOTES

**bauxite :** a claylike mineral from which aluminium is made.
**mechanical excavator :** a machine for digging, worked by oil or petrol.
**ingots :** cast metal made into bars or blocks.

**cantilever bridge :** a bridge formed by two long bracket-like trusses projecting, from stone piers, towards each other so as to make a span.

**mineralogy :** the science dealing with minerals.

**metallurgy :** the art of separating metals from their ores.

**ravages :** the ruin and destruction caused through the passing of time.

**cellulose. :** a substance obtained from wood, cotton, flax, hemp, etc.

**fabric :** texture ; manufactured cloth.

**chichon work :** beautiful embroidery work on silk or cotton articles of wearing apparel, etc.

**filigree :** a very delicate open wire or thread work in gold or silver.

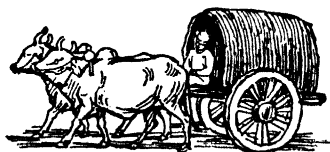
**papier mache :** paper pulp mixed with size used for moulding various articles.

**indigenous :** belonging to the country.

**avenue :** a way.

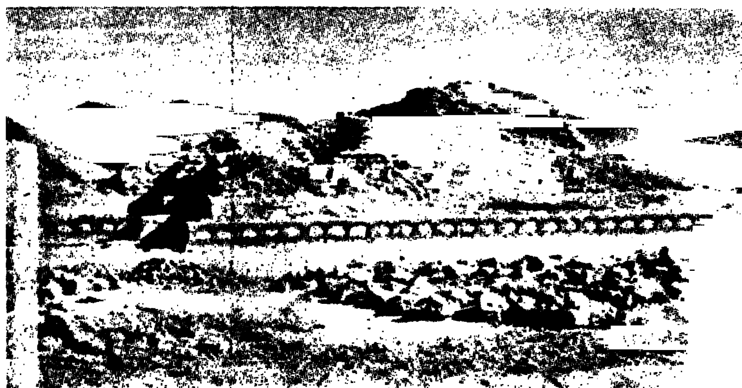
**discern :** recognise, perceive.

**antiquated :** out-of-date.



## EDUCATION—THEN AND NOW.

In ancient times one of the most important centres of learning in India was Taxila. In the seventh century B.C., scholars came to it from many parts of our country and even from other countries. Of the subjects taught there, the most popular were medicine, military arts, astronomy, accountancy, agriculture, snake-charming and magic. To us moderns the last two subjects are rather puzzling. We wonder what benefits the students derived from a study of snake-charming and magic! However, they were probably more exciting than accounts and medicine. When the Chinese pilgrim Fa-Hien visited Taxila in the middle of the fifth century A.D.



KEMAL STUPA AT TAXILA



HIUEN TSANG CARRYING HIS MANUSCRIPTS

he found that its fame had ceased, and there was nothing of importance going on there.

Another meeting place for scholars was the famous Buddhist University at Nalanda, the ruins of which may still be seen some forty miles south-west of Patna. It was probably a religious centre before Buddhist times. Its chief patrons were the Gupta kings. When

Hieun Tsang, the Chinese traveller, visited it he found that the University was housed in fine buildings and that there was a splendid library.

Now some of you may know that there were two sects of Buddhism—one the Mahayana sect and the other the Hinayana sect. Nalanda was the stronghold of the latter. It had many famous teachers who wrote valuable books on philosophy, grammar and logic. Some students spent as many as twelve years at Nalanda studying under well-known professors.

Hiuen Tsang says, "The priests, who number many thousands, are men of the highest ability and talent.



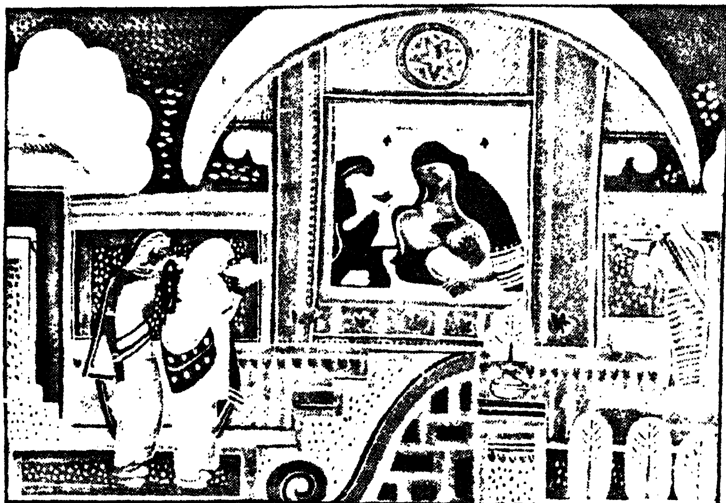
RUINS OF THE MAIN STUPA AT NALANDA

The rules of the community are very rigid and the priests have to obey them. During the whole day they are engaged in discussions. The old and the young help each other. If any unauthorized persons desire to enter the University and take part in the discussions, the keeper at the gate asks them some hard questions. Those who are unable to answer have to go back disappointed. Only those who can answer the questions are allowed to enter."

At one time students from all over India and some from China, Japan, Ceylon and Korea could be seen there. All went well till A.D. 1200 when this renowned seat of learning was destroyed by the invader.

We now turn to Bengal. There was no University, but in Nadia a large number of Tols or Sanskrit schools were founded by the Sena kings. The patronage of these rulers attracted many students to the Tols. Logic, philosophy and law were the chief subjects taught there. Amongst the distinguished scholars of Nadia was Sri Chaitanya, the great religious leader of the sixteenth century. Besides those at Nadia, there were Tols scattered all over the land.

Some students had to travel great distances to attend the classes of celebrated teachers. A student usually remained in the house of his teacher till the end of his studies. In addition to his studies the pupil did many household duties for his teacher. These included drawing water, tidying the rooms and beg-



[*Nandalal Bose*

BIRTH OF CHAITANYA

ging for his food. He had to report to his teacher what he had received by begging and only after receiving permission might he eat. Strict obedience had to be observed. A pupil could on no account contradict his teacher, and always had to take a seat lower than his. Strict rules were laid down. They included the practice of hygiene, religious precepts and good manners. The student had to beg daily and avoid anger, covetousness, meat, shoes, musical instruments, dancing, and singing. A student was not allowed to cross his legs or lean against walls when in the presence of his teacher. Laughing, yawning

and cracking the joints of the fingers were forbidden. A student was enjoined to speak the truth and nothing but the truth, and to avoid all sarcastic talk.

The Muhammedan rulers of India also took a great interest in education. Many schools, colleges and libraries were founded by them in various parts of the country. Orphanages were established and scholarships granted to brilliant pupils. In course of time Delhi became the chief seat of learning and continued to be so in spite of the general discouragement of education under the Emperor Ala-ud-din. After his death, the grants to schools and colleges were restored by his successor. Closer contact between the Muhammedans and Hindus led to the formation of a new language which became known as Hindustani.

Although Akbar is generally considered to have been unable to read or write, he was an intelligent and enlightened ruler, anxious to further the education of both Hindu and Muhammedan subjects, for he was very tolerant in religious matters. Through the help of Todar Mall, his Hindu prime minister, Hindustani became the *lingua franca* throughout the greater part of Northern India. Akbar's son, Jehangir, and his grandson, Shahjehan, repaired and re-established a number of colleges and schools. This was necessary because when Akbar died his teachers probably thought that they would no longer receive any funds and would be faced with starvation. Hence they

soon left the profession of teaching for some other means of making a living.

Muhammedan boys from the age of eight were required to attend a Maktab in order to learn portions of the Koran. This was, of course, more in the nature of religious instruction than a start towards general knowledge.

Wherever the Muhammedans came into power they generally established a college or Madrasah. Such seats of learning could be found in Delhi, Allahabad, Ajmer, Lahore, Hyderabad, etc. Some of these were more famous than others. The most celebrated was at Jaunpur, founded by Ibrahim Sharki (1402-1440). When Sikander Lodi conquered Jaunpur he destroyed most of the colleges, but he did not reign for long. After his death the colleges soon raised their heads once more above the dust and turmoil of war, and Jaunpur resumed its place as a centre of Muhammedan learning.

It should be noted that, apart from the above centres of learning, there existed all the time and throughout the country a system of more elementary education. Instruction in reading, writing and arithmetic was given by pandits and moulvis.

In 1808, under the East India Company, an order was passed setting aside one lakh of rupees every year for the purpose of education. Lord Macaulay's historic Minute on Education, was published in 1835, and

secondary education in English was started. His idea was that the knowledge of English would open to India a great deal of the learning of the West. Nevertheless many critics suggest that Macaulay's scheme, and what it developed into, have not been of real value because many boys and girls do not gain much practical knowledge about the world they live in, whereas they have to waste many valuable hours in the study of difficult literary and mathematical subjects, etc., through the medium of a foreign language instead of in one of their own vernaculars. It does seem very reasonable to believe that our younger boys and girls could learn ordinary general knowledge more easily



DRILL AT A MODERN NURSERY SCHOOL



AN ADULT NIGHT SCHOOL IN THE UNITED PROVINCES



[By courtesy of A. I. R.

A KINDERGARTEN CLASS IN THE PUNJAB

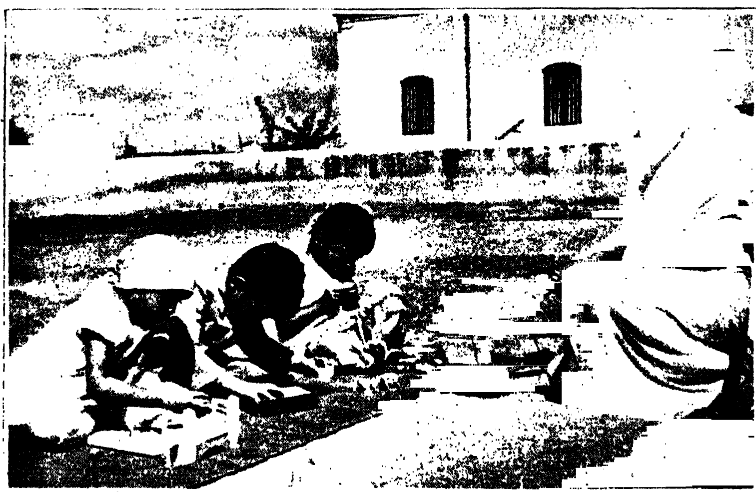
through the medium of their own language than through a foreign language which has first to be learnt with much study and labour. Again, in Macaulay's time there was not so much necessity, even in Europe, for education of a technical and commercial kind such as is required to-day.

The year 1857 is a very important date in the educational history of India. It was then that the Universities of Calcutta, Bombay and Madras were started. The Punjab and Allahabad Universities followed within the next twenty or thirty years, until now there are no fewer than eighteen universities flourishing in different parts of the country. We will not

make a list of them as you can easily find out their names.

At the present day the whole future of education in India is in the melting-pot. There is now in existence a scheme for development which, to say the least, is most ambitious. It sets forth the minimum educational requirements of India, and attempts to show how long it will take to put them into practice, and also what it will require in money, men and materials. In other words it calculates how much money and how many teachers and other people will be wanted.

The main idea of the scheme is that education for



AT A MODERN NURSERY SCHOOL

all boys and girls between the age of six and fourteen shall be compulsory and free. Subsequently they will pass on to the High School and the University. Those who are fitted to do so will receive a full technical, commercial or arts education, according to the careers they have in view.

Now it is obvious that the scheme cannot be a success unless there are teachers ready to train the pupils. Over 2,200,000 teachers will be required to bring the plan into full working order. To work for the physical welfare of the pupils, an immense number of doctors and nurses will be wanted. New buildings will be needed, with all the proper educational apparatus.

All this will need time and labour, and there is also the great problem of finding the money to pay for it all. There is one principle on which everyone agrees —the importance of seeing that teachers have a decent living wage. Their work is of high importance, and they should be given encouragement to do their best for their pupils and take a pride in their calling. Under the new scheme every teacher is to be given a salary which will be far greater than what he or she gets nowadays.

From the earliest times our country has been the home of great philosophers, thinkers and teachers. In spite of invasions, famines and pestilences India continues to be famous for the wonderful learning of her sons. Just to refresh your memories we will give you

a short list :—Kalidas (poet) ; Bhavabhuti (dramatist) ; Harsha (king and poet) ; Panini (grammarian) ; Charaka (physician) ; Kalhana (historian) ; Abul Fazl (historian) ; Faizi (poet) ; Tulsidas (poet) ; Ramdas (poet) ; Wali (poet) ; Sir Md. Iqbal (poet) ; M. R. Paranjpe ; G. K. Gokhale ; Sir Ashutosh Mookerjee ; Sir J. C. Bose ; Rabindranath Tagore ; Sir C. V. Raman ; M. N. Saha, to mention only a few. Their names are known and honoured, not in this country alone, but throughout the world.

With these illustrious examples before you perhaps some of you will wish to emulate their activities and become teachers yourselves. It is a very noble profession, and calls for sacrifice, hard study and patience, but it also has its special rewards. Think of the satisfaction you will have if after a long life of teaching you can show its results in the useful lives of many of your pupils, some of whom will undoubtedly have become famous as a result of what they learnt under your guidance.

## QUESTIONS

1. Describe briefly the conduct that was expected of a student in ancient days.

2. What is your idea of using the vernacular as the medium of instruction in schools ?

3. Write what you know of Rabindranath Tagore's University.

## NOTES

**astronomy :** the science which deals with the stars, planets and heavenly bodies.

**community :** a body of people living under the same conditions.

**contradict :** to deny the truth ; to say the contrary.

**covetousness :** a very strong wish for something ; a desire which is unreasonable or forbidden.

**sarcastic :** scornful ; taunting.

**lingua franca :** any language used over a wide area.

**turmoil :** disturbance ; agitation.

**minute :** a note or memorandum.

**in the melting-pot :** is being debated or considered very thoroughly.

**emulate :** try to equal or surpass.

**pestilences :** dangerous infectious diseases.

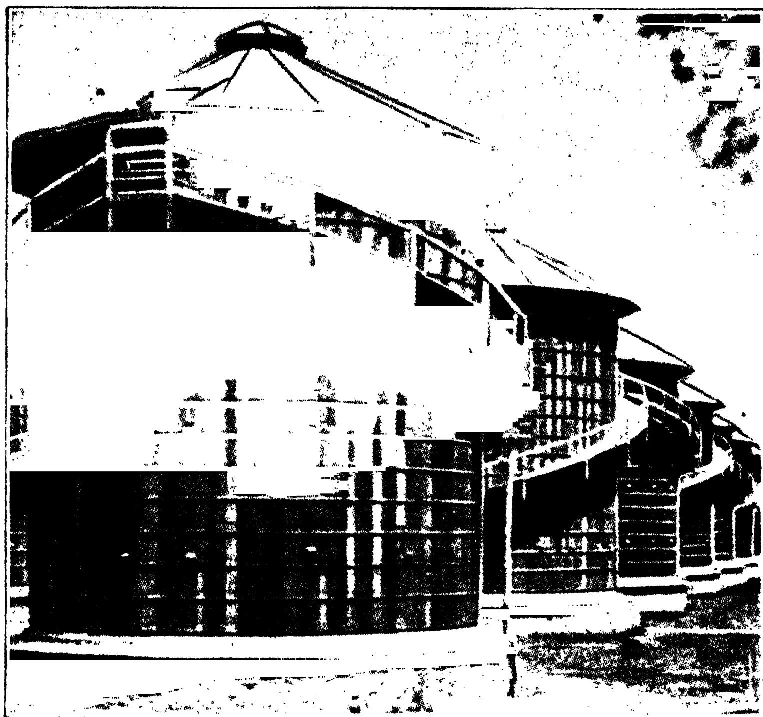
**illustrious :** distinguished ; noble.



# AGRICULTURE—THEN AND NOW.

THE people of every country *must* eat, and India is no exception to that rule. From the earliest times our ancestors ploughed the fields and sowed seeds, so that crops might come forth and give them food. Wheat, rice, pulses and vegetables were the staple food-crops of the country. I think that we must agree that our ancestors did very well, although they did not have at their disposal the modern scientific blending of seeds and powerful mechanical devices for ploughing the land: Everything was done by hand. Sometimes they had the wisdom to see that the crops would occasionally fail them, and when an especially good season came along they stored all excess grain in granaries. A notable instance of this is the Golghar at Patna; the State Granaries of Kashmir, and the Government grain store-houses at Cossipore, near Calcutta, are modern.

Agriculture was undoubtedly the principal industry of the people, but arts and crafts were also flourishing at the same time. The old writers mention sixty-four arts, which included working in metal, cloth, leather, stone, wood, and many other industries. The great iron pillars at Delhi and Dhar were manufactured in this age. The forging of such iron bars is not frequent even in Europe to-day. The products of Indian craftsmen were carried by land and sea to distant regions.



A ROW OF GRANARIES IN KASHMIR

India supplies 100 per cent of the world's jute, 60 per cent of the world's tea, 25 per cent of its cotton and 50 per cent of its oil seeds. Yet, in spite of these astonishing figures, the lot of the tillers of the soil is miserable. The holding of the average ryot is so small that it does not give him scope for using improved methods of agriculture. Another disadvantage is that he has not sufficient capital to invest in modern

machines, fertilizers, manures, etc. A large proportion of the ryots are already heavily in debt, and from being owners of the land they quickly become tillers only. Thus their hard work brings them little personal gain, and they have no incentive to do their best.

Ploughing is usually done with the help of bullocks. The capacity of these animals is not so very great and the work could be doubled and trebled by the use of machinery.

There can be no gainsaying the fact that the old system of ploughing with oxen is tedious and takes a long time. It is also certain that when present-day tillers of the soil see the machines which have been invented to assist and improve their work on the land,



MANY PAIRS OF OXEN PLOUGHING A SOUTH INDIAN FIELD



SCATTERING SEEDS

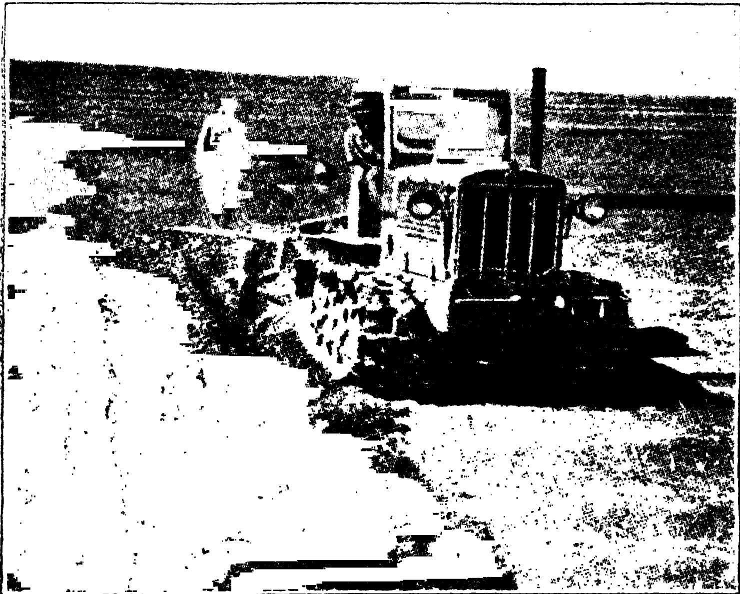
they will be eager to seize the opportunity and buy motor tractors, if funds permit.

These devices are very useful and economical. They help in digging up deep-rooted weeds, they clear very quickly land that was originally jungle, they can also help in making roads, bunds and channels. A tractor can also be employed as a source of power for any other operations including pumping, spraying and threshing of grains.

One need not be a millionaire to own one of these useful machines. For larger farms mechanical devices are, of course, very economical and useful, but there is no reason why owners of smaller farms should not benefit. A number of small farmers may club together and buy a tractor and use it jointly on their lands. Stationary oil engines are also very useful. One Zamindar uses an oil engine which drives a

pump to irrigate his lands, operates a chaff cutter, and grinds corn.

The introduction of mechanical aids in agriculture does not mean that many tillers of the ground will lose their employment. This does not necessarily follow. When machines are used there must be men to look after them, men able to keep them going and repair them when anything goes wrong. When the machines are used on the co-operative plan, then men will be required to move them from place to place. Any spare men that will be left after this can be put on to other



TRACTOR PLOUGHING ON A COLLECTIVE FARM IN RUSSIA



THE HARVEST

money-making occupations such as the marketing of poultry, eggs, vegetables and honey. Efficiency in cultivation means greater production from the land, and this means cheaper food for all.

If we need any further evidence, we have the example of the Soviet Union before us. Agriculture in Russia is carried on mostly on the co-operative plan, and wonderful results have been obtained.

In times past famines were quite frequent in India, and even during the latter half of the nineteenth century some of them were of extreme severity. The great Bengal Famine of 1943 is still fresh in our minds to show us that the danger is not past. The scenes in Calcutta city were terrible to behold, whilst in the districts the suffering was even worse.

Now let us consider the chief crops produced by the agriculturists of our land.

Rice is the staple food of the people. It is estimated that about one-third of the total cultivated area is devoted to the growing of rice. Many varieties are grown in many parts of India. The main problem of the farmers is to increase the yield, and there can be no doubt that yields become very much higher if plenty of water and good manure are used. Fertilizers are much to be preferred to animal manure. An agricultural expert says that there is absolutely no reason why India should not have an average yield of 500 seers of rice per acre. This means



A SUGARCANE FIELD

a total production of nearly thirty-four million tons.

Wheat is the next important crop. The chief areas where it is grown are East and West Punjab, the United Provinces and the North-West Frontier Province, which is now in Pakistan. As far as wheat is concerned water is undoubtedly the chief consideration. When the farmer has to depend on rainfall only he will have a much lower yield than when his lands are irrigated by canals and other means of getting water on to the land.

Another very valuable crop is castor. Castor occupies a very significant place in the world's trade in oil seeds. Besides being used for purposes of medicine, the oil from the seeds is used as a lubricant and for the preservation of leather. In some parts of India castor oil is used for lighting purposes. The cheap mineral oil at one time threatened to oust castor oil as a means of lighting, but the war soon changed the situation and now castor oil is in full use again. Castor is grown mostly in the Hyderabad State and the Madras Presidency. It also thrives in Sind and parts of the Mysore State and in the United Provinces. Castor cake is a valuable manure and is used for growing sugarcane and tea. It is especially liked by the sugarcane growers because it is supposed to keep off white ants.

As for sugar, India is the largest producer in the

world. Sugarcane is grown throughout India. Farmers were especially encouraged to grow sugarcane after the sugar tariff was imposed in the year 1932.

We have a large range of pulse crops such as grams, dal, etc. Such food has a high percentage of protein which is very necessary in India where most of the people are vegetarians.

India grows more tea than any other country in the world, and Bengal and Assam produce the bulk of it. Over 750,000 acres of land are under tea cultivation and in 1940 over 410 million pounds of tea were produced. Coffee is practically restricted to South India. In 1940 over 17 million pounds of coffee were produced.

Cotton is grown in many parts of India, and as it is grown in different soils and under different climates, the cotton which is produced is of many types.

Jute is practically the monopoly of East Bengal. Apart from its strength, its cheapness is its greatest asset. Material woven from jute is used for so many purposes that the demand for it is immense.

Another crop which is of great use and value is the tobacco crop. Twelve and half lacs of acres are under cultivation. In olden days tobacco was used mainly for the manufacture of *beedis* and for use in the *hookah* or for snuff. Nowadays its principal use is for cigarettes, which are made by machinery. Shredded

tobacco is fed into the top of the machine. You can see the man doing so in the picture below. The machine has already been loaded with a reel of thin cigarette paper 6000 metres long. When the machine is started it prints in two colours on the paper. An electro-magnet draws off any tiny metal particles that may have found their way into the tobacco. At the same time a powerful dust extractor is withdrawing all dust from the shredded tobacco. This wonderful machine turns out finished cigarettes at the rate of 1200 per minute. You will see them being assembled



[*With acknowledgments to the National Tobacco Co., Ltd., Calcutta.*

A CIGARETTE MAKING MACHINE

on a tray at the left side of the picture. The Madras Presidency is the main centre for tobacco growing. The cigars and cheroots of Madras are famous throughout India and in many parts of the world. It is quite possible that 200,000 acres of land could be fully given over to the cultivation of tobacco, and such a territory would produce 150 million pounds of good tobacco annually.

Linseed is very important, producing over 400,000 tons per year. Mustard and rape seed are grown mostly in Northern India and account for just over one million tons. Groundnuts are grown chiefly in Bombay, Madras, the Central Provinces and Hyderabad. The annual production is not less than 2,500,000 tons. Nearly 4,000,000 lb. of rubber was grown in Malabar, Cochin and Travancore in 1940.

The cultivation of fruit comes under the heading of horticulture rather than agriculture, but it falls within the scope of this chapter as it is an important part of our food supply. The orchards of Kulu in East Punjab and Northern Sind all produce high class fruit which is in very great demand. Wherever possible the fresh fruit is transported to our large cities for consumption. Any surplus of fruit is used for canning or the making of jams, chutneys, etc. The possibilities of the fruit business are enormous, and there is absolutely no reason why the preserved fruits should not be exported to all parts of the globe. The essential



TINS FILLED WITH FRUIT PASSING THROUGH A MACHINE WHICH SEALS THEM

thing is that our canned and bottled fruit must bear comparison with foreign products. The fruit must be good and free from blemish. Marketing methods also have to be greatly improved.

Now probably most of you know that it is no good growing the same commodity on the same field year after year. The different crops have to be changed about. For instance, for one season it may be sugar-cane, then it may be castor, then it may be cotton. It

all depends on the soil and the climate. This is the important principle of the rotation of crops.

If you feel you would like to work on the land, then you should join an agricultural college and learn the scientific methods of growing things. Then with the aid of your special knowledge, arable lands, ample manure and fertilizers, and good seeds and plants, you ought soon to be reaping a rich harvest of crops and fruits. You will thus not only secure your own prosperity, but make a valuable contribution to the food supply for the benefit of your fellowmen.

## QUESTIONS

1. Give a list of the chief food crops of India.
2. What articles are made from jute ?
3. Where are the chief tea gardens in India ?
4. Write a short essay on the advantages of the mechanical plough over the plough drawn by oxen.
5. Where are the best fruit orchards in India and Pakistan ? Give a list of the fruits grown in them.

## NOTES

**granaries :** places for storing grain.
**fertilizer :** a manure or chemical material to give strength to plants or crops.
**incentive :** that which encourages or stimulates.
**devices :** methods devised or designed.
**tractor :** a machine which pulls or draws something, such as a plough.

**threshing :** beating out the grain from the husk ; separating the grain from the chaff.

**chaff :** outside husks of grain.

**staple :** chief commodity of a country.

**lubricant :** any substance, such as oil, used for smoothing or softening ; a substance causing a machine to work smoothly.

**protein :** an essential part of food.

**monopoly :** sole right for dealing in anything ; exclusive possession or contract.

**blemish :** a stain ; a defect.

**rotation :** in regular succession, one after the other.



## MEDICINE—THEN AND NOW.

There have always been sick persons in India, as in other countries, and where there is sickness there must be doctors, nurses and medicine.

The Rig-Vedic period is usually regarded as lying between the years 4000 and 2500 B.C. The later hymns of the *Rig-Veda* make it clear to us that a well-developed civilization was already in existence. The Aryan people were engaged in fighting other tribes from time to time, and we read in the *Rig-Veda* that surgeons accompanied the army to the battle-field. They went to attend to the wounded, extracting arrow shafts from the injured soldiers, amputating legs, removing damaged eyes, etc. In Vedic India, those engaged in the art of healing were divided into three classes, surgeons physicians and magic doctors. The houses of the physicians were surrounded by gardens where they grew herbs and medicinal plants. They experimented with these plants and when it was found that a certain plant had qualities of use to the physicians, an account of it was given in the *Rig-Veda*. It is remarkable to note that in the *Rig-Veda* there is a whole hymn describing how the disease of phthisis should be treated.

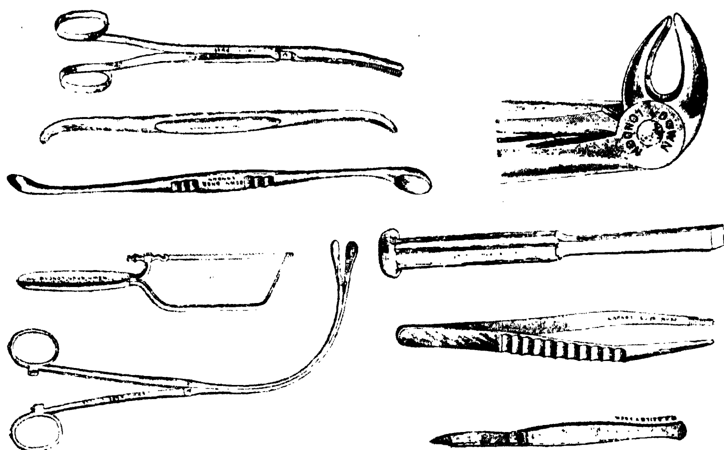
The *Artharva Veda* sheds further light on the subject. It gives a list of medicinal herbs to be used in the treatment of leprosy, jaundice, dropsy, etc. By

this time the ancient system of medicine was Ayurvedic. Ayurveda means the Science of Life. It describes the causes of diseases and the means of curing them, especially leprosy, diseases of the eye, ear, nose and throat, fevers, consumption, diabetes, mental diseases, diseases of children, poisoning, etc. There was a college of physicians headed by Atreya, whose works on Ayurveda are the oldest in existence. Dhanvantari was the father of Hindu medicine and was the principal of a college of surgeons in the Ayurvedic University in Benares. His pupil Susruta's work on medicine is also highly respected.

In the epic period of Indian history the army surgeons were fully equipped with all the necessary appliances for carrying out minor and major operations on the field a battle. In the *Mahabharata* we read that Duryodhana, the chief of the Kurus, when pierced with arrows, was placed by the surgeons in a bath full of medicated water, whereupon he was freed from the arrows. In the *Ramayana* we read that a wonderful elixir called Sanjivani was given to patients to restore them to consciousness.

Two medical men of the period stand out above all others They are Charaka and Susruta. Their books on Hindu medicine were revised again and again by many doctors from time to time. Charaka was a great physician and his book is divided into 120 chapters. He knew all about physiology and diet. His

book includes information about poisons, medical instruments and appliances. He gives minute instructions for the erection and furnishing of hospitals, as also sick rooms for children. Susruta was the son of Visvamitra. He was a great surgeon. In his book he classifies surgical operations under five different heads and gives a list of a hundred and one blunt instruments and twenty sharp instruments for use in such operations. It is interesting to read that most of the modern instruments are only slightly different from those used by the ancient Hindu surgeons.



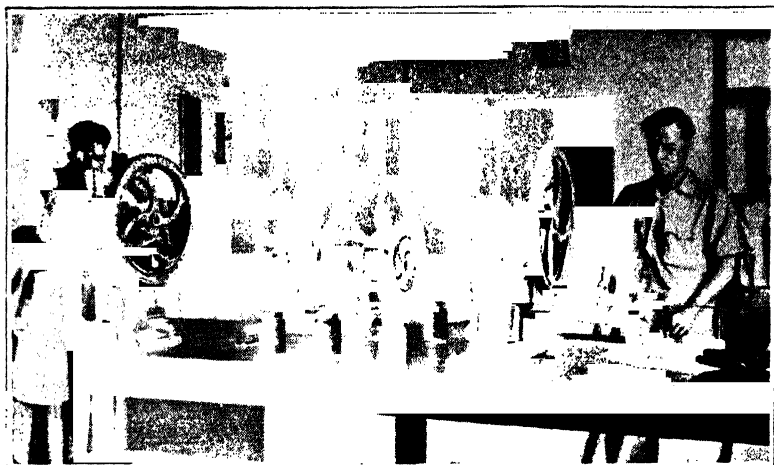
MODERN SURGICAL INSTRUMENTS

Susruta insisted that the sick-room should be fumigated with incense and that after the operation the wound should be sterilized by fumigation, thus anticipating to some extent the antiseptic methods of to-

day. In his time limbs were amputated, abdominal operations were performed, fractures and dislocations were attended to, and many other remarkable feats of surgery were achieved. Both Charaka and Susruta used a special medicinal wine called Sanmohini which produced insensibility to pain. The fumes of burning hemp were also used as an anæsthetic. In A.D. 927 a delicate operation was performed on the head of King Bhoja of Dhar. The king was made insensible by the use of Sanmohini. The surgeons then opened his skull and removed a growth from the brain. They then closed the opening and stitched the wound. Sanjivani, which has been mentioned above, was given to the king to restore him to consciousness after the operation. Even in the twentieth century such an operation has to be carried out with the greatest care. Just imagine the same operation being performed a thousand years ago !

The University of Taxila was very famous for its medical school. In the University at Nalanda there were 100 lecture rooms where 10,000 students received instruction.

Jivaka, a physician of Buddha, carried out operations on the brain with great success. When the soldiers of Alexander were bitten by snakes, the Greek doctors could do nothing to cure them, and Alexander was obliged to consult Indian doctors, who treated such cases successfully.



MODERN MACHINERY IS USED FOR THE MANUFACTURE OF AYURVEDIC MEDICINES

In the time of Chandra Gupta hospitals were built and store rooms were stocked with medicines in large quantities. Physicians and surgeons were always kept ready to meet emergency. The surgeons with their instruments and appliances, bandages and nurses, always accompanied the army, and we are told their presence reassured the soldiers. Even in such early times all cases of violent death had to be investigated by means of a post-mortem examination, the results of which had to be reported to the law officers.

After the time of Asoka we do not read so much about Hindu medicine. There is however mention of a great doctor Bhava Misra, who lived in Benares in A.D. 1550, who is said to have had four hundred pupils

under him at one time. He wrote a huge book on anatomy, physiology, medicine, surgery, etc.

It is interesting to note that during the reign of Harun-ul-Rashid, A.D. 786, Hindu doctors practised in Baghdad and translated books on medicine and surgery from Sanskrit into Arabic. Manka, the Caliph's Hindu physician, cured him of a dangerous sickness. He also translated Charaka's book on poisons into Persian.

From all this it is clear that Indian medicine originated in the cradle of Aryan civilization. Hindus were the first to understand the physiology of the human body and to provide dispensaries and hospitals for men and women. They were also the pioneers in plastic



AN OPERATION IN PROGRESS

surgery and major operations such as amputations, etc. Large quantities of Ayurvedic medicines are prepared and sold throughout India. It is interesting to note that most of them are now prepared by modern machinery.

In Mughal times the Unani system of medicine, as practised by the Muhammedans, came into its own although the Ayurvedic system was still practised.

In these days the treatment of the sick has been revolutionised, yet many of the old Hindu methods of treatment have been retained and modernised. A great innovation has been the system of inoculation against smallpox and other diseases. The lives of many millions of people have been saved by the use of this preventive method. Chloroform was first used for medical purposes early in the nineteenth century, but as you have read above, the ancient Indian surgeons were practising a form of anæsthetic when they used Sanmohini. The idea of disinfecting the operating theatre with incense, etc., has developed into the modern practice of sterilization by boiling and other antiseptic methods.

We who live in this age have a lot to be thankful for. Our ancestors did not have the benefit of the sulphanilamide group of medicines and penicillin, which are very recent discoveries for the treatment of serious illnesses and injuries. Typhoid, malaria, tuberculosis, cholera and dysentery were all rampant

in ancient days, but people have not yet found out how to prevent and combat these terrible diseases.

Nowadays the number of Medical Research Institutes in India is steadily increasing. Their latest achievement is the preparation of penicillin. The Haffkine Institute in Bombay has shown the possibility of producing this wonderful new drug in India for sale purposes. What a prospect for the relief of suffering is immediately opened up by this fact ! The mould *penicillium notatum* is stowed into culture flasks. After ten days' incubation at a certain temperature each bottle contains about 15,000 units of penicillin. It takes the contents of about hundred of these bottles to



STOWING THE PENICILLIN MOULD INTO CULTURE FLASKS AT THE HAFFKINE INSTITUTE, BOMBAY

produce enough penicillin of good quality to treat one single case. In the picture the stowing is being



SEALING THE VACCINE AMPULES AT THE CENTRAL RESEARCH INSTITUTE AT KASAULI. THE VACCINE IS MANUFACTURED IN INDIA

done by Dr. Ganapati of the Haffkine Institute, Bombay.

The Central Research Institute at Kasauli, near Simla in the Himalayas, does much research into the

chief diseases which afflict India's peoples. It also specialises in producing snake-bite, anti-venene and anti-rabic sera.

India to-day needs more doctors, more nurses and more hospitals. It is quite possible that many of you who read this book may wish to become doctors or nurses. No nobler profession can be thought of, and if such is your intention, you should begin at once to learn all you can, so that your work of alleviating disease and helping the sick may be as effective as possible. You will earn the thanks of your own generation and posterity.

## QUESTIONS

1. Give a short account of the doctors and their methods in ancient times.
2. Compare antiseptic methods of the past with those of to-day.
3. Write what you know of penicillin.

## NOTES

**well-developed** : well-grown.
**amputating** : the cutting off of a limb.
**elixir** : a cordial or tonic that invigorates.
**consciousness** : the state of being conscious ; awake.
**physiology** : the science of animal and vegetable life.
**diet** : food ; a prescribed course of feeding.
**fumigate** : to cover with smoke or vapour in order to destroy insects or infection.

**incense :** fragrant spices which give a pleasant perfume when burnt.

**sterilize :** to disinfect ; to free from bacteria.

**antiseptic :** medical productions which prevent decay.

**fracture :** a crack or break in a bone ; where the bone is broken into several parts.

**dislocation :** the putting of a bone out of its proper place.

**post-mortem :** the examination of a body after death.

**innovation :** the introduction of something new.

**inoculation :** the act of inoculating ; the insertion of a serum into the body through the skin to prevent an infectious disease.

**alleviating :** to give ease to ; to lessen the pain ; to make lighter.

**posterity :** one's descendants ; the people in time to come.



## COMMUNICATIONS—THEN AND NOW.

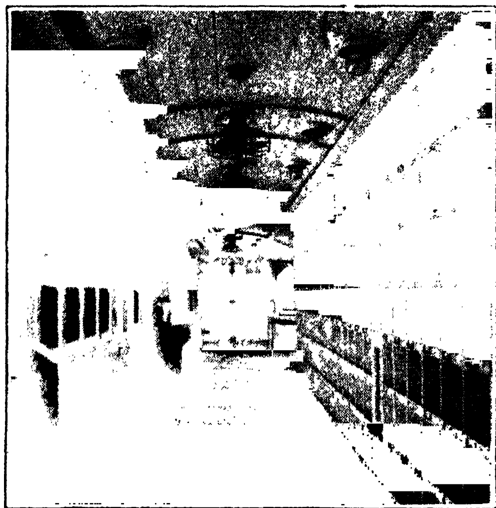
By communications we mean the methods used in communicating between one person and another, or between one person and hundreds of others. The word is sometimes used to mean roads, railways, etc., but we will speak of these in the chapter on Travel.

In ancient times messages were sent from one place to another by means of a man who either walked or ran, or rode on a horse, pony or elephant. This system took days and days, and even then sometimes the messenger never arrived at his destination, having been eaten by wild animals or waylaid by robbers.

The kings and princes had very special messengers who generally rode on horseback. In Mughal times the government started a system of delivering letters by *dak*. Sometimes the letters were carried between large towns by means of horse carriages, or bullock carts; and from there onwards they were taken by *dak* runners into the interior of the country. A charge was made for this.

Another method of giving information to people was the reading of news or notices in the public streets by beat of drum. When the people heard the drum being beaten they naturally flocked to find out what was going on, and when they had gathered round they were told whatever it was that had to be made public. This method is still in use in some parts of India.

Then in 1854 the postal system was started. All one had to do was to buy a postage stamp and stick it on the letter which was to be sent and then put the letter in the post-box, and the postal authorities did the rest. They collected all the letters, sorted them, and then sent them by transport, that is by carriage,



[*By courtesy of the Indian State Railways*

INTERIOR OF THE MAIL VAN ON LONG DISTANCE TRAIN

train, or ship to the places mentioned on the letters. This meant a great saving of time and money. Later on postage stamps became much cheaper.

In 1836 a very clever man called Morse invented a code in which words could be tapped out over the telegraph wires in the form of dots and dashes. The tele-

graph had been originated in 1819 by another clever man called Oersted, who discovered the magnetic field produced by an electric current. These principles were applied by two scientists whose names were Wheatstone and Cook. Messages sent by this system are called telegrams. This method of sending messages was introduced into India in 1854. Telegrams can now be sent all over our country and to nearly every part of the world. Just think how wonderful that is ! By merely using the Morse code on the telegraph



[*By courtesy of the Indian State Railways.*

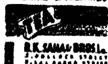
BAGS BEING REMOVED FROM THE MAIL VAN ON ARRIVAL AT DESTINATION









































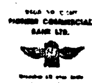


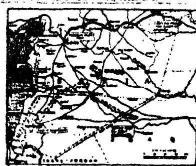











SOME POPULAR NEWSPAPERS

instruments, a message is sent to places thousands of miles away over telegraph wires running in all directions over the land and even under the ocean.

Still another means of communication between people is the telephone. This was invented by Bell in 1876. We can speak to our friends, or to people with whom we have business, whether they are in the same town or in a town hundreds of miles away. It is also

possible to communicate with our friends in other countries by means of the telephone.

Another way of spreading news and telling people about other people and the things they make and sell is the newspaper. For one or two annas one can buy a newspaper which it is a pleasure to read. The latest news is all set out in such a way as to attract the eye at once, and then there are interesting articles, often with illustrations, describing what is happening in the world around us and in "Our India." Events in the political world, the doings of inventors and research workers, the work of doctors and physicians and details of the new medicines they are discovering, the doings of film stars, all the varied items that can inform or entertain the public, are published in our newspapers.



VILLAGE GIRLS BROADCASTING



[*By courtesy of A. I. R.*

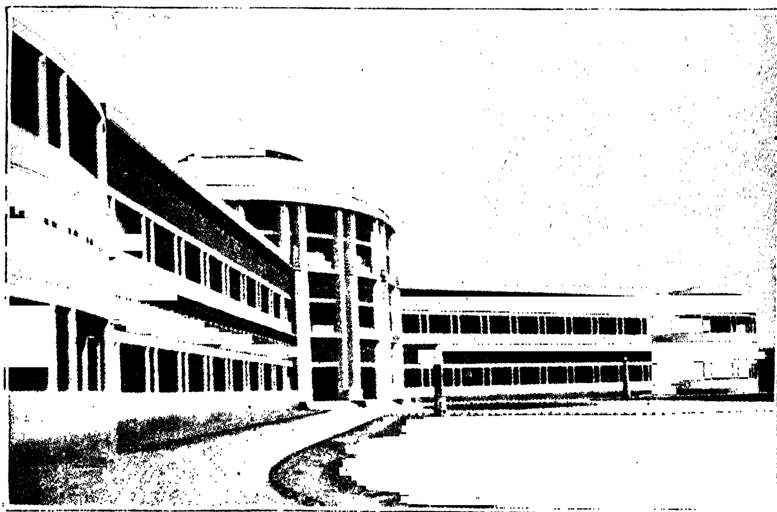
CHILDREN'S HOUR AT A. I. R. DELHI

Still another means of communication is wireless telegraphy. In this case there are no wires at all between places. The same Morse Code is used, but there the similarity between the old telegram and the wireless message ends. The possibilities of wireless were first discovered by James Lindsay in 1832. After him came Clerk-Maxwell and Hertz. For the development of wireless as we know it, we are indebted to Marconi. We must, of course, not omit the experiments in this line made by our own research scholar, the late Sir Jagadish Chandra Bose.

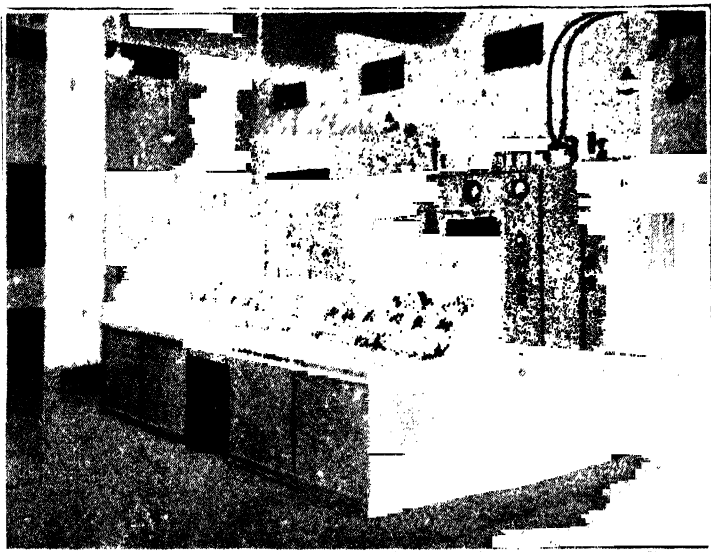
A still greater miracle is that of wireless telephony. A radio set in a house will inform the householder and

his family of everything of importance that is going on in the world. Sometimes very important messages about epidemics and other dangers to life are broadcast, and the householder can take the necessary precautions. For those who have not got a radio set in their house, the one in the bazaar, with its loud speaker, will give all the news to the usual large crowd that collects in front of it.

What is the next step to be ? It will undoubtedly be the coming of television, which will enable us to *see*, on a screen forming part of our radio set, or on a larger screen in a public building, the person who is broadcasting or the scene which is being described.



BROADCASTING HOUSE, NEW DELHI



[*By courtesy of A I R*

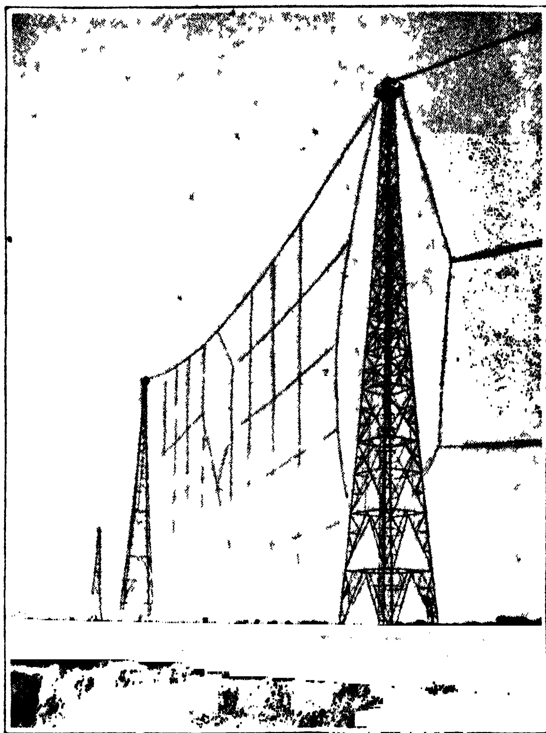
HIGH POWER TRANSMITTERS, WITH CONTROLLED DESK IN THE FOREGROUND WHERE SWITCHING OPERATIONS ARE CONDUCTED

This has already been done in Europe and America, and we may be sure that one day the apparatus will be within the reach of all

If you ever walk down Parliament Street in New Delhi you will find a very imposing building. The design of this large building is of three long arms spreading out from a flat-roofed central tower. You will see many people coming and going. What is this place ? It is Broadcasting House, the headquarters of All India Radio

News is broadcast daily in the chief languages of

India, Europe and the East. I will give you a list of them and I am sure you will be surprised : Hindustani, Punjabi, Hindi, Bengali, Tamil, Telugu, Malayalam,



HIGH-POWER BEAMS OF A I R, NEW DELHI

Marathi, Gujarati, Burmese, Malay, Tonkinese, Cochin-Chinese, Kuoyu, Shanghai, Amoy, Cantonese, Thai, Japanese, French, German, Italian, Pushto, Persian, Afghan-Persian, Arabic and English.

As we stroll about the corridors of Broadcasting House we soon notice there is an air of suppressed excitement just beneath the surface. Everywhere there are clocks, offices and studios. The programmes are controlled by time, and everybody has to be ready for his or her programme on the tick of the minute. They must not begin before they should, and they must not be " on the air " a moment longer than arranged.

In the main newsroom things are very lively. Machines called teleprinters, which type out on a long strip of paper whatever is being typed on the main machine in a central office, produce yards and yards of news. This news is edited by the news-editors, and what you and I hear over the radio is the result of their work. The studios are air-conditioned and sound proof. A red light over the door shows that a programme is "on the air." If you look through a small peep hole in the door you may see the performers, singing or reading from their scripts. The walls are of glass and over 25,000 square feet of it have been used in Broadcasting House. Having passed the studios we come to the Control Room where the engineers regulate the sound coming from the different studios.

Out in the fields surrounding Broadcasting House are eight 300 feet aerial masts besides many smaller ones. Programmes go north-east to China and Japan, south-east to Thailand and Malaya, north-west to England and Europe, south-west to Africa and Mad-

agascar, east to Burma and west to Afghanistan and Iraq. Sometimes there are eight totally different programmes going out over the ether at the same time. All India Radio employs over nine hundred people.

Between the studios and the towering aerials on the one hand, and the listeners in homes, streets, halls and camps on the other, there is a gulf that would not have been crossed by any other means. The mysterious wireless is the link between the two

## QUESTIONS

1. Make a list of different methods used from ancient times to the present day in communicating between persons.
2. Which do you think the more wonderful, the radio or television ? Give your reasons.
3. Give in your own words a short description of what goes on everyday at All India Radio Broadcasting House, New Delhi.

## NOTES

**inventors** : those who invent something original.

**research-workers** : learned men and students who investigate, examine and criticise.

**suppressed** : kept down ; checked; restrained.

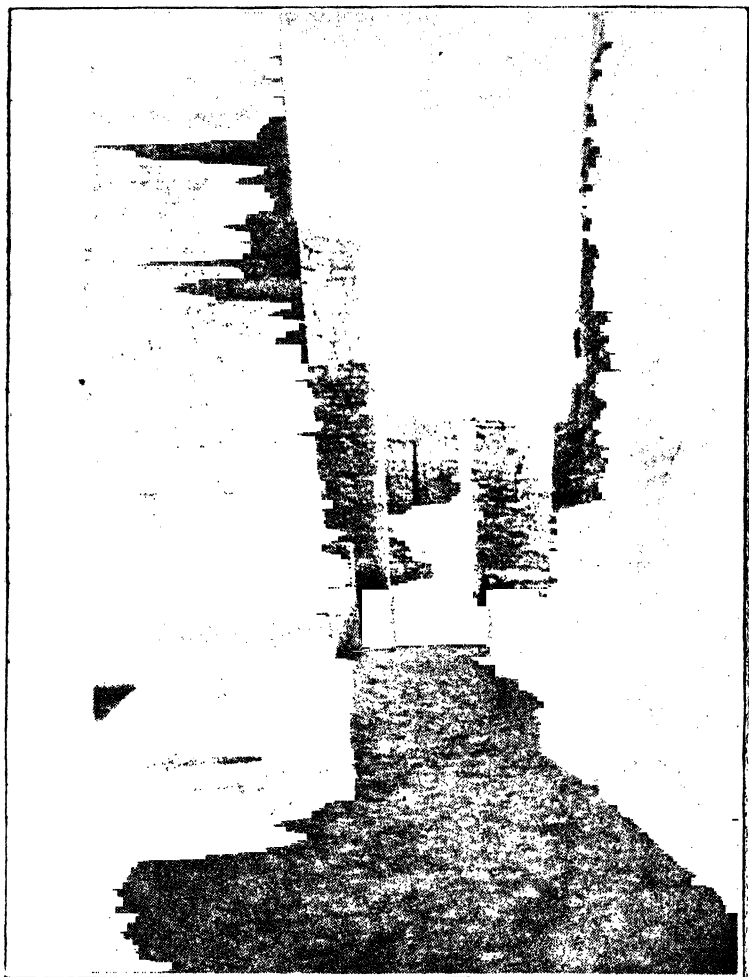
**air-conditioned** : a room, hall or enclosed place in which the air is regulated to a certain temperature, purified and circulated.

**'on the air'** : means that something is being broadcasted from a certain place.

# HOUSING AND LIGHTING—THEN AND NOW.

WHEREVER there are people they instinctively look for a place in which they can sleep and shelter from the vagaries of the weather, be it heat, cold, or rain. Nearly 7,000 years ago some of the inhabitants of India, as may be seen by the ruins of Harappa and Mohenjo-Daro, built substantial dwelling houses where they were safe from the hot rays of the sun and the torrential rains of the monsoon. Yet it will most probably be discovered that alongside these houses there were much more primitive huts for the poor. Throughout the ages we find the palaces of kings and nobles close to the huts of their humblest subjects, and it is the same even down to the present day. Intermingled with the substantial dwelling houses of the middle classes and the palatial offices of business men will be found the insanitary, filthy, squalid clusters of huts which represent the modern dwelling places of many workers.

In far-off days it was the hut made of branches of trees and dried leaves which housed our ancestors. Caves in the hill side were also largely used as dwelling places. Eventually families found these quarters a little too small, and so the bamboo cottage was evolved. Walls of bamboo or bamboo strips with mud packed between them were erected, and thatched roofs were added. In course of time the hot sun dried the mud



A LANE IN THE ANCIENT CITY OF MOHENJO-DARO

and shrank it up so that the walls were soon full of holes. Something much better was required.

So in those far-off-days mud was mixed with straw and other materials and was made into bricks, which were baked so that they would not shrink or be affected in any way by the weather. These bricks were laid together in such a way that solid walls were made. Large pieces of stone properly trimmed were also used, and as the builders came to understand the principles of house building, they increased the strength of the ground floor and then proceeded to add other floors to their buildings. This process was gradually evolved until in most of the chief towns of India huge buildings of seven or eight stories nowadays raise their heads



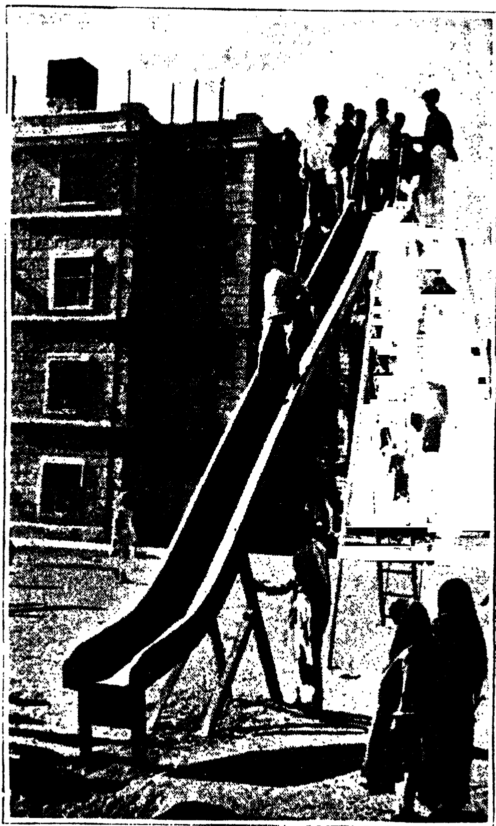
CLEAN AND TIDY HOUSES IN MYSORE



MODERN FLATS IN BOMBAY

to the sky, impervious to all the onslaughts of the weather. The many poor, however, still live in their huts.

Has the housing problem been solved yet ? I think that the answer is, "No, it has not." Only recently, in the enormous city of Calcutta, the powers-that-be have been discussing how to improve the lot of the worker and remove him from the insanitary and squalid *bustees* of the city.



PART OF A CHILDREN'S PLAYGROUND NEAR WORKERS' TENEMENTS IN BOMBAY MILL AREA

In some towns, however, the workers, especially mill workers, have been provided with huge living quarters built in tenement

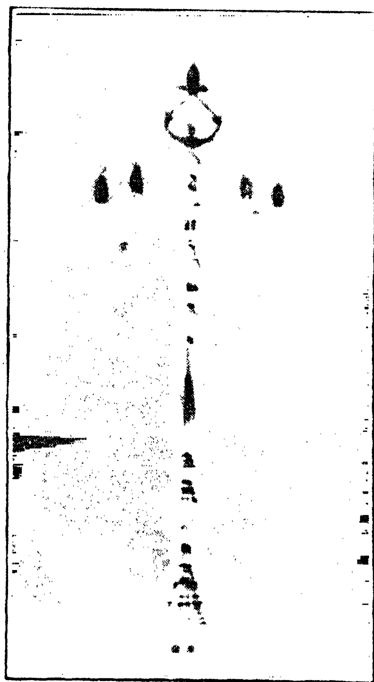
fashion, each flat consisting of one or two rooms, a bath room and a kitchen. In the Bombay mill area thousands of workers live in concrete *chawls*, each of which contains about eighty rooms. This accommodation is provided by the Development Department. It is true that rent has to be paid for such accommodation, but this is more than made up for by the absence of doctor's fees and expenses on medicine. Living in such bright and airy surroundings makes the workers' family healthy and happy, and hence sickness and disease have received marching orders. Rats, mice, scorpions and bugs cannot make their homes in such houses, and with proper water connections the residents should always be healthy. Another important feature of the tenements in Bombay are the children's play-grounds. When school is over these play-grounds are crowded with happy children eager to taste the joys of swings, slides and other attractions. Children of all castes mix freely, thoroughly enjoying themselves as only children can.

Let us keep before us the ideal of each one of us owning or renting a house of his own with a pretty little flower garden in front so that our lives may be full of colour, and a nice vegetable garden at the back so that our bodies may have ample green vegetables to keep them alive and healthy.

At this stage it will be interesting to trace the

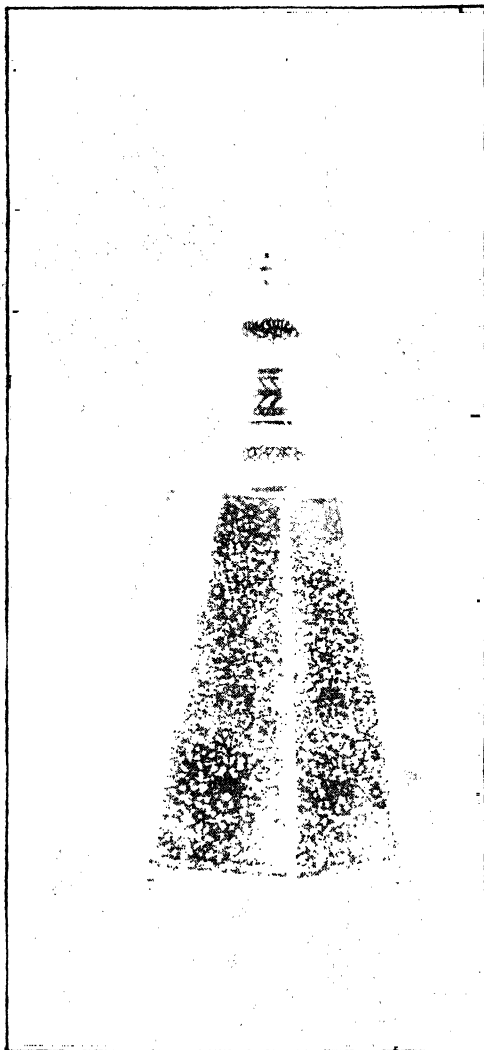
development of illumination or the lighting of houses and streets. I think we should be right in saying that in the old days there were no lights in Indian streets. The houses were lighted by means of oil *buttees*, that is, little earthernware bowls in which was placed some vegetable oil and a cotton wick. This had to serve the purposes of the middle and poorer classes.

The kings and nobles had brass lamps, which were suspended from the ceilings of their rooms or stood on the floor, as we find them in Southern India even to this day.



A STANDING LAMP

Later on huge brass lamps, beautifully perforated with wonderful designs were hung in the palaces and homes of the rich, and in the mosques and temples. Those of you who have seen the lamps in the Taj Mahal will have an idea of what I mean. Then, when mineral oil or kero-



A HANGING LAMP

sene came into use towards the end of the nineteenth century, tin lanterns and lamps of a great variety were used throughout the length and breadth of India by those able to afford them. The poor carried on with the oil *buttees.*

Later on was evolved the gas system whereby carbon-dioxide gas was drawn off from coal by burning it, the gas being stored in a

gasometer, the half-burnt coal, which was now coke, being sold as fuel. The gas was supplied to the houses of those who wished to use it in the big cities of India. The gas flowed along pipes from the gasometer to gasburners in the houses, and when the tap was turned on and a match put to the burner a nice light was the result. The oil *buttees* still satisfied the poor.

In course of time people of the large cities began to get tired of gas light. They found it dirty and costly and in some cases a strain to the eyes, because several jets were necessary to make a really good light.

The next step was the introduction of electric light. Now electricity is a very complicated subject, but you will learn more about it as you progress in your college studies. All we need know at present is that electricity is generated by great machines in what are called power stations. Most of the large cities of India have such stations, and it is from these that the current is distributed along wires to our houses, shops, factories and streets. If we wish to use the electric



A SMALL MUD LAMP

light we have to arrange for our house to be properly wired by an expert electrician, and when he has done this, all we have to do is to insert an electric bulb into the holder. We then merely turn on the switch, and our room is flooded with a beautiful white light. This satisfies the fortunate people who live in cities where electricity is available. It is best to use an electric bulb made of frosted glass. This glass secures a uniform distribution of the light and prevents it from dazzling and hurting the eyes.

Other people who live in out-of-the-way places and want a bright light have recourse to what is known as an acetylene lamp. These lamps consist of a container in which calcium carbide is placed, on to which water is allowed to drip The fumes given off are carried to a jet which produces a brilliant light when it is ignited with a match.

I do not know when wax candles were first used in India, but they have long been very popular.

So you see that in considering this question of lights, from the centuries old common oil *buttee* to the modern electric light, we have covered a space of some thousands of years. I wonder if we shall live to see any other kinds of illumination.

QUESTIONS

1. Examine the picture on page 82 and write what you think about the kind of houses which were built seven thousand years ago.

2. What would you do to improve the *bustees* and slums of our great cities ?

3. Write a short essay on the evolution of lighting from the earliest times to the present day.

## NOTES

**instinctively :** urged from within.
**squalid clusters :** filthy, wretched and poverty-stricken groups.
**impervious :** that cannot be penetrated or passed.
**bustees :** slums.
**powers-that-be :** persons in authority.
**tenement :** a large house, divided into apartments each occupied by a different family.
**evolved :** unfolded ; unrolled ; developed.
**ignited :** set on fire.



## TRAVEL—THEN AND NOW.

WHAT a tremendous difference there is in the means of travelling to-day as compared with one hundred years ago ! The slow, toilsome journeys on foot, in palanquins, bullock-carts, pony jutkas, and horse-driven carriages are things of the past in many parts of India. We are now in the machine age, and people travel mainly in steam and electric trains, motor cars, electric tram cars, motor buses and taxis. It is hard to imagine this twentieth century without all these means of transport, but it is still harder to imagine what India would have been like to-day if it had continued to jog along with palanquins, bullock-carts, oxen and camels.

Tavernier, the great traveller of Mughal times, says : " It was an astonishing sight to behold caravans comprising of 10,000 or 12,000 oxen for the purpose of transporting rice, corn, and salt—carrying rice to where only corn grows, and corn to where only rice grows, and salt to the places where there is none. Camels are reserved for the baggage of the nobles. When the merchants wish to get their goods quickly to a port in order to ship them, they load them on oxen and not on carts. Those who drive these oxen follow no other trade ; they never live in houses but take their women and children with them on the road. Some of them possess one hundred oxen, others more and others less. They all have a chief who acts as a

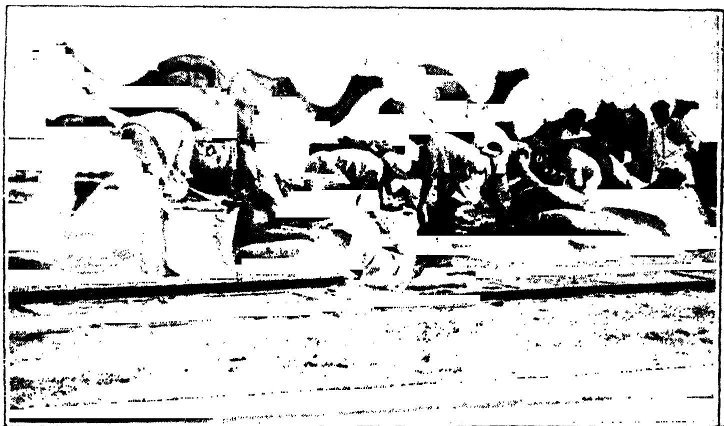


A COVERED BULLOCK-CART

kind of prince, and who always wears a chain of pearls round his neck.

"When the caravan which carries corn and that which carries rice meet, rather than give way one to the other, they often engage in a fight leading to blood-shed. The Great Mughal, considering that these quarrels were prejudicial to commerce and to the transport of food in his kingdom, arranged that the chiefs of the two caravans should come to see him. When they arrived, the King, after he had advised them for their mutual benefit to live for the future in harmony with each other, and not to fight again when they meet, presented each of them with 100,000 rupees, and a chain of pearls.

"Whilst the men load their animals in the morning, the women fold up their tents. Each waggon is drawn by ten or twelve oxen, and accompanied by four soldiers, whom the owner of the merchandise is obliged to pay. Two of them walk on each side of the waggon over which two ropes are passed, and the four ends are held by the soldiers so that if the waggon threatens to upset in a bad place, the two soldiers who are on the opposite side hold the rope tight, and prevent it turning over. You should take care when you buy or hire an ox for riding that he has not horns longer than a foot, because, if they are longer, when the flies sting him, he chafes and tosses back his head, and may plunge a horn into your stomach, as has happened several times. These oxen allow themselves to be



LOADING CAMELS



THE PALKI GHARRY

driven like horses, and have for a bridle only a cord, which passes through the tendon of the muzzle or the nostril."

There were also, for travelling purposes, small light carriages which could carry two persons ; but one usually travelled alone in order to be more comfortable. These carriages were provided with curtains and cushions, but were not slung. " On the occasion of my last journey," says Tavernier, "I had a carriage made after the European manner and the two oxen by which it was drawn cost me very nearly six hundred rupees. The reader need not be astonished at the price, for there are some oxen which are strong and make

journeys lasting sixty days at the rate of twelve or fifteen leagues a day, trotting all the time. When they have accomplished half the day's journey they are given two or three balls made of wheaten flour kneaded with butter and black sugar, and in the evening they have a meal of peas, crushed and steeped in water for half an hour. The hire of a carriage amounts to about a rupee a day."

For those who could afford to take their ease, a palanquin was very comfortable. This was a kind of bed, six or seven feet long and three feet wide, with a small rail all round. A bamboo cane supported the



[*Photo : Mr. Cecil Beaton.*

A PALANQUIN CARRIED BY FOUR MEN



THE DAK GHARRY

cover of the palanquin which was of satin or brocade. The palanquin poles were five or six feet long. Three men at most placed themselves at each of these ends and carried the palanquin on their shoulders, one on the right and the other on the left. When one wished to make haste and travel as much as thirteen or fourteen leagues a day, twelve men were necessary to take turns in carrying the palanquin.

Any one who desired to travel with dignity in those days, whether by carriage or palanquin, had to take with him twenty or thirty armed men, some with bows and arrows and others with muskets. These men not

only upheld the traveller's dignity, but they also watched over him at night, relieving one another from time to time. For it should be mentioned that in the towns where these men were hired there was a headman who answered for their honesty, and when any one employed them each man gave the headman a rupee.

The reason which made the presence of armed men necessary at one time was the existence of Thugs, who used to infest the roads of Central and Northern India. These people were murderers and robbers, and once a traveller got into their hands there was not much hope of his ever reaching his destination. They were suppressed just about one hundred years ago and over 2500 of them were shut up in a large building near Jubbulpore where they were taught a trade and discipline. You will be able to read all about the Thugs in a book called *Confessions of a Thug* written by Meadows Taylor. See if it is in your school library.

Apart from this there was the constant danger from wild beasts and unruly tribes. The Mughal rulers wisely gave their subjects some protection from these perils by setting up walled enclosures, or *serais* along the main roads. Here travellers and merchants could pass the night in comparative safety.

To quote Tavernier once more :—

" The great heat of India compels travellers to travel by night, in order to rest by day. When they enter towns which are closed they must leave by sunset, if

they wish to take the road. For when night comes, and the gates are closed, the Governor of the place, who has to answer for thefts which occur within his jurisdiction, does not allow any one to go out. and says that it is the Emperor's order, which he must obey. When I entered such places I took provisions, and I left early, in order to camp outside under some tree in the shade, waiting till it was time to march."

Before the beginning of the nineteenth century there were very few good roads in India, and as you have already read, goods were mostly carried by oxen, horses, ponies and camels. The majority of travellers had to get to their destination on foot and thus their journeys took many days.

Construction work on the East Indian Railway began in 1850 at two points, Howrah and Allahabad. The wonderful bridge over the Jumna at Allahabad was completed in 1865 and the Delhi bridge over the same river was ready in 1866. By 1871 the East Indian Railway had a total mileage of 1280 with many miles of double track. In March 1948 the figure of 4378 mileage was reached. To-day railways radiate from the chief ports of India and extend throughout the length and breadth of this vast country covering in all 42,000 miles. Even then there are many places of importance which are not yet connected by the railway. Undeveloped coal fields, immense mineral deposits and jungles full of timber in many parts of the



[*By courtesy of the Indian State Railways.*

THE LATEST THIRD CLASS CARRIAGE, E.I.R.

land await the advent of the railway so that their products may be speedily sent to places where such things are required. It is most probable that in the near future, when more money is available, our Indian railways will be expanded at an almost unbelievable rate.

From the 1st of January, 1949, the Intermediate Class of accommodation was done away with and there are now only First, Second and Third Class carriages. A new type of carriage for the Third Class has been designed. It gives much more room for passengers and better water and lavatory arrangements. Pictures of the outside and inside of such a

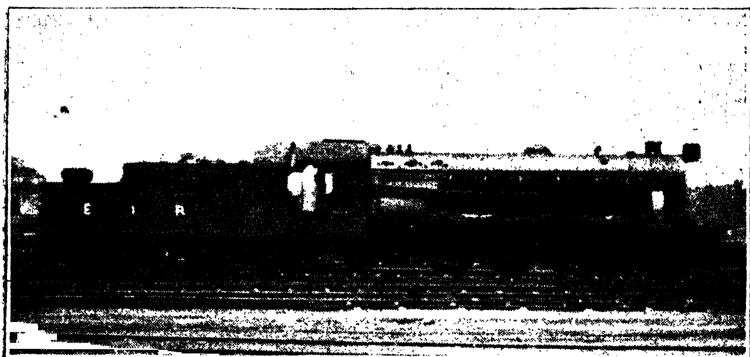
coach are printed here by the courtesy of the East Indian Railway.

This popular railway connects the Port of Calcutta with the coal mines of Bengal and Bihar, the fertile plains on both sides of the river Ganges,



[*By courtesy of the Indian State Railways.*

THE INTERIOR OF THE LATEST THIRD CLASS CARRIAGE




[*By courtesy of the Indian State Railways.*

THE LATEST TYPE OF ENGINE, E.I.R.

the capital of the Dominion of India and the hill stations of the Himalayan range.

The advent of electricity has also helped transport. We have electric trains and electric tram cars which take many hundreds of thousands of passengers to their daily work and bring them home again in the evening.

Last, but not least is the petrol-driven motor car, motor bus and motor taxi. All over the world the long-distance motor bus and motor lorry have greatly supplemented the work of the railway. For all these vehicles the pneumatic tyre is essential. We have to thank the inventive genius of J. B. Dunlop for the means of being able to move about swiftly in motor-driven vehicles.

Do we ever give a thought as to how these pneumatic tyres for motors are made ? The chief raw material

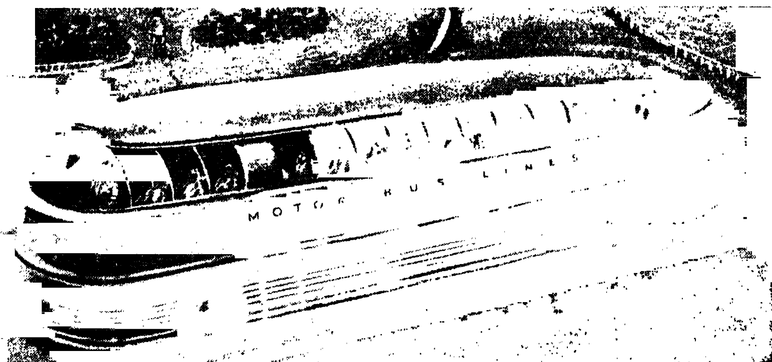
used in their manufacture is rubber. The west coast of India is very suitable for the production of rubber because it has a warm moist climate and its soil is well drained. These are conditions best suited to the rubber trees. There is a small but flourishing industry which produces about 17,000 tons of rubber a year. This small contribution to the world supply became exceedingly useful when most of the rubber-producing countries fell for a time into the hands of the Japanese. The rubber plantations are usually large and employ hundreds of labourers including women. Each plantation has a factory where the juice of the rubber trees, which is called latex, is transformed into rubber sheets.

Besides rubber the other materials used in the manufacture of pneumatic tyres are chemicals, cotton and steel wire. The Dunlop Rubber Co. has a huge factory in Bengal where it employs Indian labour. The workmen are supervised by learned Indian scientists and chemists.

The raw rubber used in making pneumatic tyres in the Dunlop Factory in Bengal, comes from South India. It reaches the factory in the form of smoked sheets. Of the chemicals used, sulphur is the most important because it gives, when combined with heat, the familiar property of elasticity which is the principal characteristic of the rubber tyre. Carbon black is a powder which gives the tyre treads long life. It also acts as a kind of lubricant in the rubber structure, and

also between the tyre tread and the road surface. There are also softeners and preservatives employed in the making of tyres. Cotton of the finest quality is used in the tyre case, and is made into a cord of various thicknesses. Steel wire forms the basis of the beads of the outer cover and gives them the "inextensibility" which provides the means of keeping the tyre on the rim. "Inextensibility" is a long word which merely means "the quality of not stretching or extending."

Having considered some of the materials used, we will now pay a visit to the factory. First of all we are shown the smoked rubber sheets being cut into pieces and blended. When the blending has been thoroughly done, the rubber is broken up in what is called a masticating mill. It is now necessary to mix the masticated rubber with various drying powders and chemi-




A MOTOR BUS OF THE FUTURE

cals, of which sulphur and carbon black have already been mentioned.

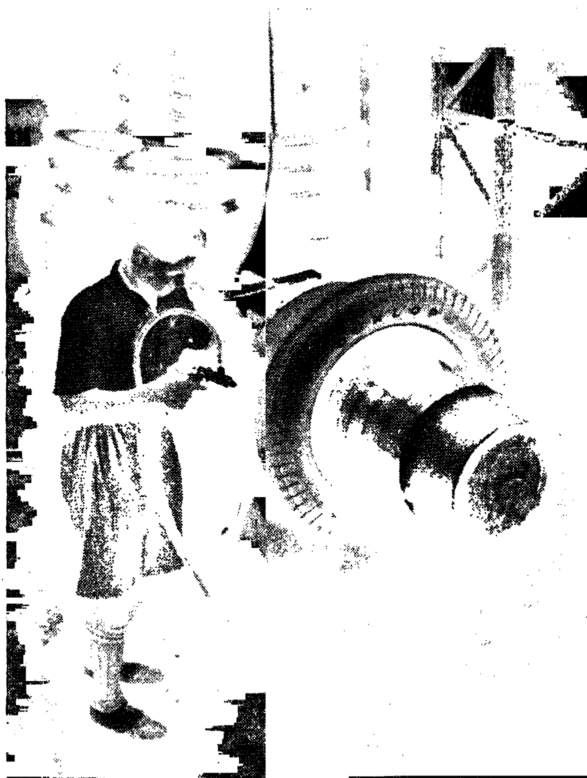


[*By courtesy of The Dunlop Rubber Co.*

RUBBERING CORD FOR MOTOR COVER CASINGS

When the mixing has been completed on a roller mill, the rubber is cut off into large sheets about four feet square and three-quarter of an inch thick and

dropped into a mixture of french chalk and water. This cools the rubber and prevents the sheets from



[*Bu courtesy of The Dun'op Rubber Co.*

MOTOR COVER PAINTING

sticking together. The sheets of mixed rubber are stacked in bins ready for use at a later date.

The covering of casing cord with rubber is a very

delicate process which is carried out in an enormous machine called a " calendar." Bobbins of cotton cord are mounted on spindles fixed at suitable intervals. The ends of the cords pass between rollers coverd with mixed rubber. The cords finally emerge from the calendar in the form of a continuous length of fabric with a coating of rubber on each side. This is then cut into strips of the required width for building a tyre.

The making, shaping, moulding and finishing of covers is all done by delicate and wonderful machinery, which also makes the rubber tubes which go inside the tyres. When the tyre is finished it is fixed on to a revolving cone where it is covered with paint by means of a spray. It is then ready for the road.

The difficult and technical process of tyre-making was until a few years ago mainly confined to the factories of Europe and America. But when Indian technicians and skilled workmen are well able to understand and carry out these difficult processes why should they not do so? This was readily realised by the proprietors of the Dunlop Rubber Co., who have thus become the pioneers in India of the making of india-rubber tyres. They are to be praised for encouraging Indian workmen to learn all about the making of this necessary commodity. Inasmuch as the main ingredient of these tyres is rubber which is produced in India in fairly large quantities, there can be no doubt that the industry has a great future in our country. It

will probably take a long time to develop this activity so that it can cater completely for Indian requirements, but why should we not look forward to the time when



SLEEPING QUARTERS ON A FLYING BOAT

India will send pneumatic rubber tyres to all quarters of the globe.

Such has been our progress from the simple bullock-cart to the complicated motor car. I wonder

what the ancients would have thought of modern traffic and its problems !

Now the latest development in travel is the aeroplane. One could not say that this was a popular means of transport as long as the use of the aeroplane was mainly confined to military purposes. The time will come however, when people with money to spend will not hesitate to take an aeroplane from an airport in any part of India to the place which they want to reach quickly. The aeroplane does away with the hot and dusty travel by the railway trains, and as the aeroplanes of to-day are so vastly different from those of even five years ago, especially as regards speed and comfort, we may hope that in the near future super-aeroplanes will be at our disposal in India. Already there are a number of air lines at work in India and Pakistan, the chief airports being Bombay, Calcutta, Delhi, Madras and Karachi.

We have not so far mentioned the sea-going and river-going ships and boats which journey round our coasts and up and down our rivers. In some parts of the country the river steamer is an absolute necessity. On some of our coasts a steamer journey is the only means of getting from one part of the coast to another. Even these means of transport will be developed in the future and travel in steamers and boats will be more comfortable and much more speedy than at present. The watchwords for travel in India are,

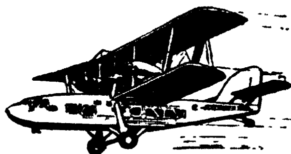
therefore, "more safety," "more comfort," and "more speed."

## QUESTIONS

1. Name some of the means of conveyances in olden days.
2. Make a list of the chief railway lines in India.
3. Write in your own words how india-rubber tyres are made.
4. Describe a journey from Trivandrum to New Delhi.

## NOTES

**prejudicial** : to hurt or to cause injury or damage through prejudice.
**tendon** : tissue joining a muscle to the bone.
**muzzle** : the mouth and nose of an animal.
**slung** : suspended with ropes.
**kneaded** : mixed into a pasty mass.
**muskets** : hand guns carried by soldiers.
**radiate** : to send forth rays.



## THE FINE ARTS—THEN AND NOW.

WHAT are the fine arts ? Usually the term is limited to the arts of design—painting, sculpture, architecture, and work of the highest order in precious metals and jewellery. Sometimes it is also used to cover poetry, drama, music, dancing, and every art that expresses and fosters a love of the beautiful.

As regards Indian painting, we can safely say that it was born at Ajanta. The Ajanta caves are about fifteen miles from Aurangabad in the Hyderabad State. They are carved out of a great mass of rock about 250 ft. high. They were begun between 200 B.C. and A.D. 650. The famous Chinese traveller, Hiuen Tsang, visited them in A.D. 640. In very far-off times there were no books as we know them, and the ancients sought to teach others by means of the paint brush and chisel. They vied with each other in depicting on the walls of their caves scenes from Buddha's life and the lives of his associates.

It is apparent that the walls and pillars of these caves were first cut out and then made quite smooth, and over the smooth surface a thin coating of plaster was put. Only then were the walls and pillars considered ready to receive the artistic touches of those who were to depict for posterity the everyday scenes of the India of their time.

The colours used in the Ajanta paintings are so

delicate and beautiful that the greatest difficulty has been found in trying to restore these frescoes which have become damaged during the course of the ages.



MOTHER AND CHILD
(AJANTA PAINTINGS)
CAVE XVII

On the walls and pillars of these caves are beautiful paintings of princes and princesses, ordinary men and women, the preparation of food, the carrying of water, buying and selling in the bazaar, hunting scenes, elephant fights, men and women playing musical instruments, dancing and singing.

The historical value of the pictures depicted in the Ajanta Caves is very great, as the Raja of Aundh rightly says :—

" In these pictures we have the history of the many past lives of Buddha and in addition we learn a number of things about this part of the country in Aryavarta

about two thousand years ago. The pictures throw light upon the mode of living of the people of the Dravidian culture in Maharashtra ; upon the ways the males and females dressed, their head-dress and ornaments, the fashion in which they arranged their hair ; upon the clothes, the ornaments, the weapons, the seats they used ; the way they stood and gesticulated ; the manners of the people of dignified society of those days ; the manners of sadhus, kings and of the lower-class people, and of the servants ; the way the dancers danced, the musical instruments they used ; the customs among Brahmans and the weapons of wai, etc. We get a pretty good insight into all these matters, when we carefully observe the pictures of Ajanta."

We have seen that painting was practised at Ajanta during the Buddhist period. Subsequently during the Hindu period the Rajput school came to the fore, afterwards followed by the Mughal school.

The Rajput painters were the real descendants of the painters of Ajanta. Their paintings depict in colour kingly personages and humble peasants, as also many religious subjects, the most popular being Sri Krishna.

In Akbar's time the art of painting received great help from Abdus Samad and other Persian artists. They taught their methods to our artists and thus a



LADY WALKING IN A GARDEN

*Rajput School, 16th century.*

new Indian style was soon flourishing, the leaders being Daswanth and Basawan.



THE BIRTH OF SALIM

From Blochet's *Mussalman Painting*

[*By permission of Messrs. Methuen & Co.*

Another style called the Rajasthani system of painting was current in the Punjab Himalayas and the

Kashmir State in the seventeenth century. These pictures are beautifully designed and full of bright colours. They depict scenes from the Indian epics and also give the likenesses of kings and queens living at the time.

After the Mughals, many of whom disapproved of all methods of portraying natural objects, the art of painting rapidly declined, and it was not till recently that its revival took place under the guidance of Abanindranath Tagore and Nandalal Bose. It is to these well-known artists that we are indebted for the modern Bengal school of painting. These enthusiastic workers, like their ancestors, painted subjects dealing with Indian mythology, but there is a more modern school which specialises in portrait and landscape painting. Many of these beautiful pictures can be seen in the Calcutta School of Art, where they are exhibited from time to time, and where the teachers try to imbue their young colleagues with the ideals of Abanindranath Tagore and his disciples.

In Abdur Rahman Chaghtai the Punjab has a modern artist whose work is charming and beautiful. The work of M. V. Dhurandhar and the students of the Sir J. J. School of Art, Bombay, has also earned high praise.

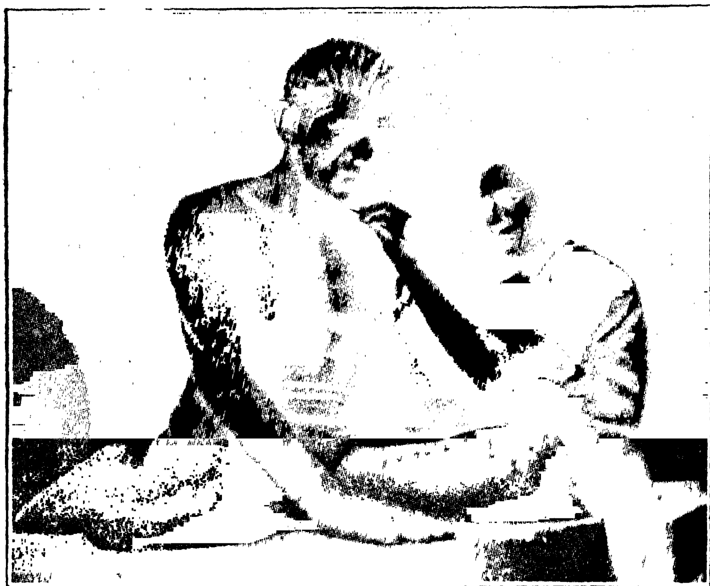
The caves of Ellora, which are near Bombay, are fine examples of sculpture. The Kailasa temple is really magnificent. It is hewn out of the heart of the



[*By Abanindranath Tagore.*

THE EXILED YAKSHA
Modern Bengal School.

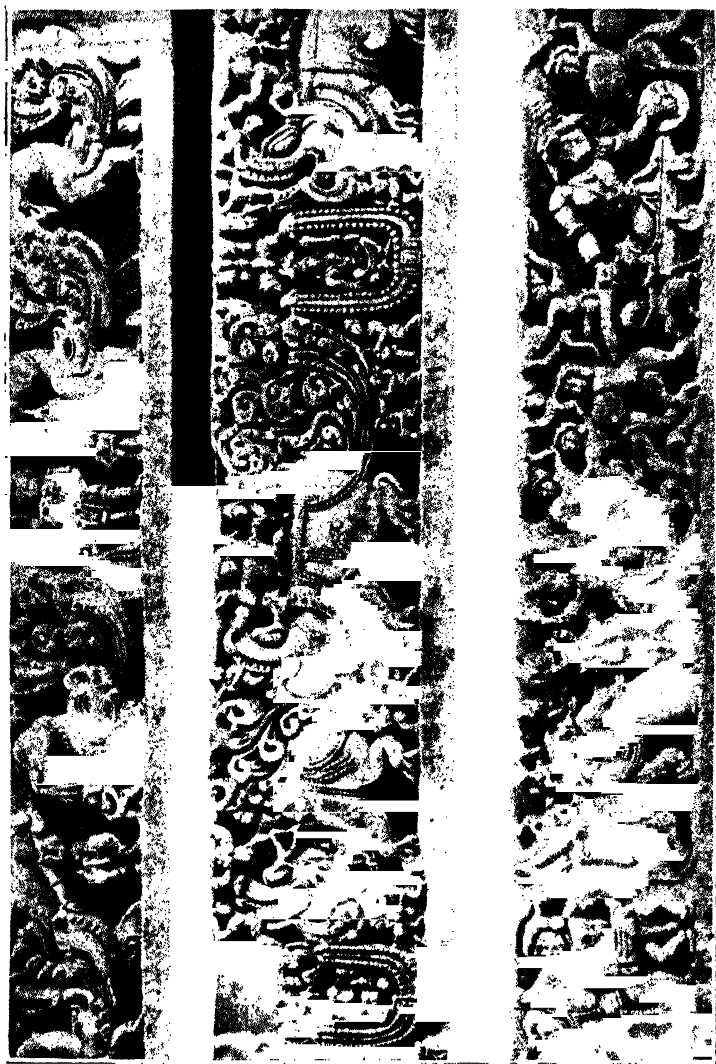
rock and is a vast carved monolith, that is, a single piece of stone. Yet to look at it from a distance it would seem to be a temple built up piece by piece of stone and other materials. But it is not. It is one



LADY SCULPTOR AT THE SIR J. J. SCHOOL OF ART, BOMBAY

block of rock. The decoration is wonderful! The scenes depicted are from the *Ramayana* and the *Mahabharata*, and the same devotion to minute details is to be found in all the caves at Ellora. Some of the caves were painted but only slight traces of the paintings are left.

Very beautiful sculptures are to be found at the



HAYSALASVARA TEMPLE. A BEAUTIFUL SCULPTURE IN STONE

Sanchi Topes and at Budh Gaya. As is usual with such buildings erected during the Buddhist age, the carvings represent scenes from the life of Buddha and illustrate the legends and miracles connected with his life. The Raths at Mahabalipuram are also excellent specimens of the sculptors' art.

Have any of you seen the wonderful carvings in the Dilawar Temples at Mount Abu, or the Halebid group of temples in Mysore ? You could spend days and days admiring these marvellous results of the patient chisel-work of Indian artists.

It is only in recent years that Indian artists, both men and women, have seriously taken up sculpture once more. There are so many fine stone carvings scattered about the length and breadth of India that they should be a source of inspiration to all young sculptors. The students of the Sir J. J. School of Art, Bombay, are turning out some striking specimens of sculpture under the very efficient guidance of its principal and the assistant professors.

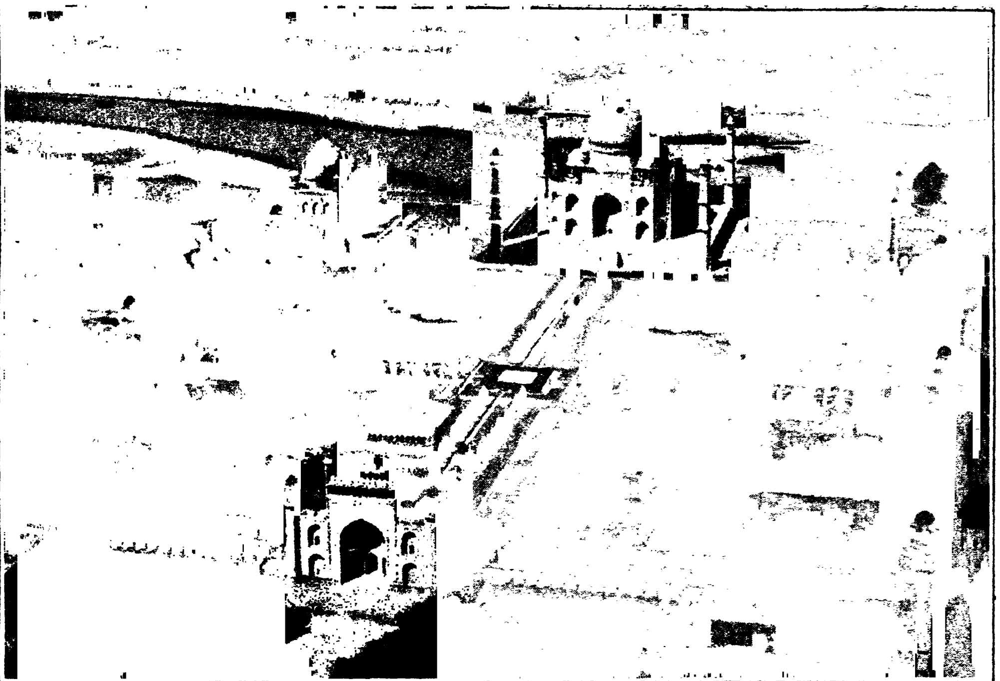
When we come to consider architecture, there are in India a large number of very remarkable buildings, some of which we will refer to later on, but the one building that comes to mind when the name of India is mentioned anywhere in the world is the Taj Mahal.

A great art critic says :—

" No building in India has been so often drawn and photographed as this, or more frequently described,

but, with all this, it is almost impossible to convey an idea of it to those who have not seen it. If the Taj were only the tomb itself it might be described, but the platform on which it stands, with its tall minarets, is a work of art in itself. Beyond this are the two wings, one of which is a mosque, which anywhere else would be considered an important building. This group of buildings forms one side of a garden court 880 ft. square ; and beyond this again an outer court of the same width but only half the depth. This is entered by three gateways of its own, and contains in the centre of its inner wall the great gateway of the garden court, a worthy pendant of the Taj itself, beautiful as it is in itself, the Taj would lose half its charm if it stood alone. It is the combination of so many beauties, and the perfect manner in which each is subordinated to the other, that makes up a whole which the world cannot match and which never fails to impress even those who are most indifferent to the effects produced by architectural objects in general.

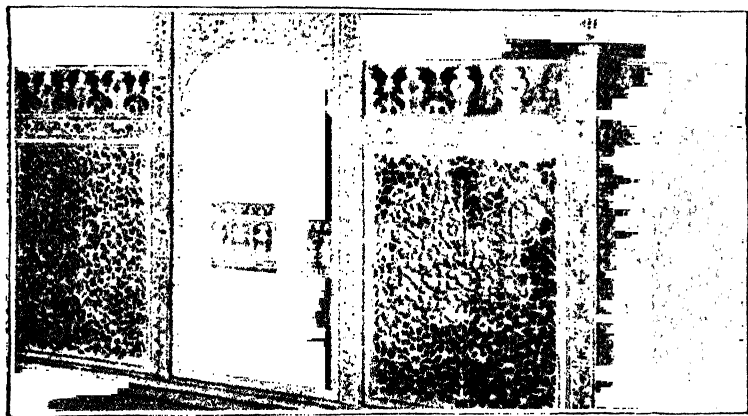
"The raised platform on which the tomb stands is 18 ft. high, faced with white marble, and exactly 313 ft. square. At each corner of this terrace stands a minaret 133 ft. in height, and of the most exquisite proportions, more beautiful, perhaps, than any other in India. In the centre of this marble platform stands the mausoleum. No words can express the chastened beauty of the central chamber, seen in the soft gloom



THE TAJ MAHAL

of the subdued light that reaches it through the distant and half-closed openings that surround it.

"This building, too, is an exquisite example of the system of inlaying with precious stones which became the great characteristic of the style of the Mughals after the death of Akbar. All the spandrels of the Taj, all the angles and more important architectural details, are heightened by being inlaid with precious stones, such as agates, bloodstones, jaspers, and the like. These are combined in wreaths, scrolls, and frets, as exquisite in design as beautiful in colour ; and, relieved by the pure white marble in which they are inlaid, they form the most beautiful and precious style of ornament ever adopted in architecture. This mode of ornamentation is lavishly bestowed on the tombs themselves and on the

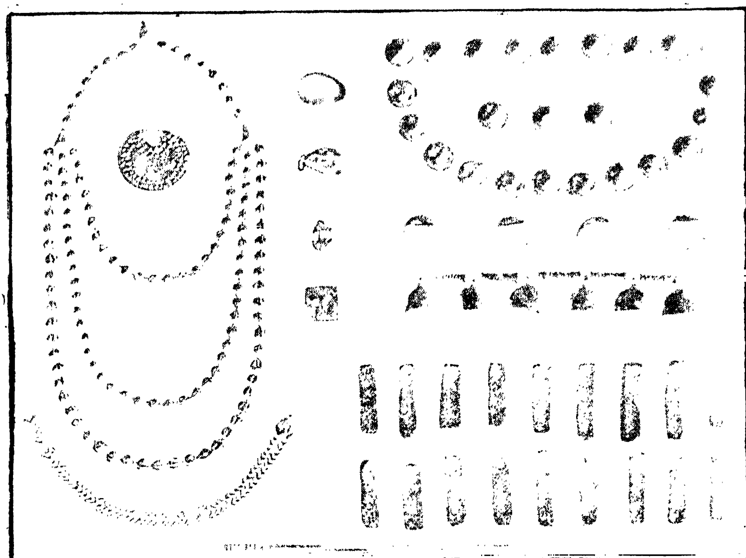


WONDERFUL MARBLE SCREEN IN THE TAJ MAHAL

screen that surrounds them, though sparingly introduced on the mosque that stands to the west of the Taj, or on the fountains and surrounding buildings. The judgment, indeed, with which the style of ornament is apportioned to the various parts is almost as remarkable as the ornament itself, and conveys a good idea of the skill of Indian architects in Mughal times.

"The long rows of cypresses, which line the marble paths that intersect the garden at right angles, and are backed up by masses of evergreen foliage, lend a charm to the whole which the founder and his children could hardly have realised. With the Jumna in front, and this garden with its fountains and gateway behind; with its own purity of material and grace of form, the Taj may challenge comparison with any creation of the same sort in the whole world."

Other architectural gems in our land are the Conjeeveram temples, the Srirangam temples at Trichinopoly, the Madura and Rameswaram temples—all in Southern India; the Black Pagoda at Konarak, the wonderful Palaces of Rajputana, the Gwalior Fort, the Jumma Masjid at Delhi, the Gol Gumbaz at Bijapur, the Kutb Minar near Delhi, the wonderful mosques in Ahmedabad, the city of Fatehpur Sikri, the Golden Temple at Benares, the temples of Bhubaneswar, the Great Imambara of Lucknow, the Jagannath Temple at Puri, and among modern work, the Legislative Council Buildings



GOLD AND SILVER JEWELLERY AND COINS DISCOVERED AT TAXILA

at New Delhi, and the Victoria Memorial Building, Calcutta.

When dealing with Indian jewellery we have only to look at the pictures of that discovered at Mohenjo-Daro and Taxila to see how artistic were our ancestors living five thousand years B.C. There we have a valuable collection of jewellery, gold and silver bangles, ear ornaments, gold knitting needles, handsome necklaces and exquisitely engraved seals. Sir John Marshall says, " The gold ornaments are so well finished and so highly polished that they might have come out of a Bond Street jewellers of to-day rather than from a pre-

historic house of 5000 years ago." During all periods of Indian history the goldsmiths and jewellers have been kept busy in preparing handsome pieces of jewellery to adorn their kings and emperors and their queens and princesses, not to speak of other classes of society. Gold in abundance is found in India, especially in Mysore, as also precious stones in great variety, including diamonds, rubies, sapphires and topazes. Pearls are found near the coast of South India and off the island of Ceylon. A very large trade in precious stones used to be carried on, especially in Mughal times.

Tavernier, in his travels, says :—

" On the first day of November, 1665, I went to the palace to take leave of the Emperor, but he said he did not wish me to depart without having seen his jewels.

" Early in the morning of the next day five or six of the Emperor's officers and others announced that the Emperor wished to see me. Immediately on my arrival at the Court the two custodians of the royal jewels accompanied me into the presence of His Majesty ; and after I had made him the customary salutation, they conducted me into a small apartment, which is at one of the ends of the hall where the Emperor was seated on his throne, and whence he was able to see us. I found in this apartment, Akil Khan, chief of the jewel treasury, who, when he saw us, commanded four of the imperial eunuchs to bring the jewels, which were carried in two large wooden trays

lacquered with gold leaf, and covered with small cloths made expressly for the purpose—one of red and the other of green brocade velvet. After these trays were uncovered, and all the pieces had been counted three times over, a list was prepared by three scribes who were present.

"The first piece which Akil Khan placed in my hands was the great diamond. Its water is beautiful, and it weighs 319½ ratis.

"After I had fully examined this splendid stone, and returned it into the hands of Akil Khan, he showed me another stone, pear-shaped, of good form and fine water, and also three other table diamonds. Each weighed 55 to 60 ratis, and the pear 62½ ratis. Subsequently he showed me a jewel set with twelve diamonds, each stone of 15 to 16 ratis and all roses. In the middle a heart-shaped rose of good water, which weighed about 35 to 40 ratis. Also a jewel, set with seventeen diamonds, the largest of which could not weigh more than 7 to 8 ratis, with the exception of one in the middle, which weighed about 16. All these stones are of first class water, clean and good form, and the most beautiful ever found. Also a round pearl of



A BEAUTIFUL BRACELET MADE BY S. N. PURSRAM, JEWELLER, BOMBAY

great perfection, a little flat on one side, which weighs 56 ratis. I ascertained that Shah Abbas II, King of Persia, sent it as a present to the Great Mughal."

Modern jewellers are just as skilful as their ancestors and many lovely articles of jewellery are manufactured in the India of to-day.

From the earliest times the practice of dancing in India has been connected with religious worship. Most of the old Hindu temples provided for dancing, which was full of religious meaning, as part of the worship of the gods. Many of these old dances were in danger of being forgotten, but then came a modern revival in the art of dancing, the most conspicuous figure in this



UDAY SHANKAR

being Uday Shankar. He did not confine himself only to religious dancing, but conceived the idea of an Indian ballet using the gestures and movements of Indian dancing to express modern ideas. In olden days dancing was carried out by women and girls only, but in the ballet arranged by Uday Shankar and others, both men and women dance together.

The dancers of Manipur and those of Sereikella obtained world-wide fame, and the company organised by Uday Shankar toured the whole of Europe and America, thus bringing an ancient Indian art before large occidental audiences.

The Manipuri dances are executed only by women. The Kathakali dancers of Malabar also produce wonderful ballets in which the performers are beautifully dressed in gorgeous colours.

As we have said before, the origin of Indian dancing is religious, its purpose being to put into movement the stories about the Hindu Gods, so as to make them easily understood by the masses. We are told that there are seventy-two hand gestures, each having a meaning of its own which is as definite as the meaning of the letters of the alphabet. There are also nine sets of facial expressions which help to convey to the audience all the emotions of human nature.

India has produced many great poets and playwrights. Those mighty Sanskrit epics, the *Ramayana* and the *Mahabharata*, with which the names of

Valmiki and Vyasa are associated, are world-famous. Our most celebrated dramatist was Kalidasa, who wrote the immortal play *Sakuntala* or *The Lost Ring*, besides a number of other pieces. Other masterpieces are those of Sudraka, who was the author of the play called *Mrichchhakatika* or *The Clay Cart*, and Bhavabhuti, who lived in the first half of the eighth century and wrote many plays of which *Malati Madhava* is perhaps the most popular.

In the long line of illustrious poets we have the Emperor Harsha; Faizi, one of the Nine Gems of Akbar's court; Tulsidas and Ramdas, poets of Mughal times; and also Wali. In modern times the poems of Sir Mohammed Iqbal won him a wide reputation.



THE LATE SIR MOHAMMED IQBAL

These are the most important of our poets, although there are many hundreds of others whose names are not so familiar.

Last in this noble company comes Rabindranath Tagore whose plays are still performed before eager audiences and whose poetry is read by thousands. His plays include *The Post Office*, *Chitra*, *The King of the Dark Chamber*, and *Red Oleanders*. During his life-time he himself produced his plays at his University at Santiniketan. He taught his students all they could learn about play-acting. He took the leading parts and his enthusiasm quickly affected his fellow actors.

Now that you have read this short review of the fine arts in India, what are your impressions ? I should imagine you to be very proud of your ancestors' achievements. Anything you can do to brighten the lives of your fellow men is certainly worth doing. If any of you have artistic ambitions you should study and strive to equal the artists whose work has been described to you. You will be honoured in your life-time and posterity will remember you with gratitude.

## QUESTIONS

1. What do you mean by the Fine Arts ?
2. Give a brief description of the various schools of painting described in this lesson.
3. Write an essay on the Taj Mahal.
4. What are your favourite jewels ? Give your reasons.
5. Describe briefly the story of Sakuntala.
6. Write what you know about Rabindranath Tagore.

## NOTES

**pendant :** a suspended object or ornament.
**subordinated :** of secondary or lesser importance.
**chastened :** purified ; refined.
**spandrels :** the spaces between the arches and their frame work.
**scrolls :** an ornamental design of a spiral nature.
**ballet :** a theatrical performance in which dancing is the chief item.
**occidental :** of the West ; belonging to Europe, or the western hemisphere.
**gestures :** movements of the body or limbs as an accompaniment or substitute for speech ; motions or signs.
**facial expressions :** expressions and signs made with the face : (see gestures).



# INDIAN SHIPPING—THEN AND NOW.

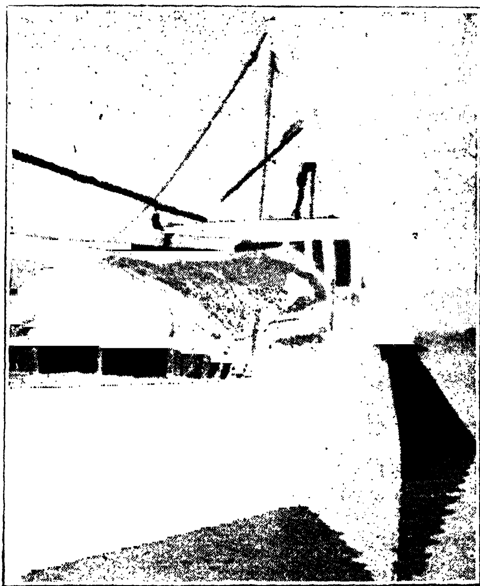
It is not very widely realised that from the earliest times our ancestors were engaged in the navigation of the seas around India and of the large rivers such as the Indus and the Ganges. It is quite obvious that they could not have done these things unless they had ships and boats of various sizes at their command. Now boats and ships do not drop from the skies. They have to be designed and built. So it is not surprising to learn that in those early days there were ports and harbours of India crowded with ships of all sizes and shipyards in which they were built. Even under the Mauryan Emperors ship-building was going on. Sea-going vessels built in India and manned by Indians reached the shores of Africa, Madagascar, Malaya, and even the distant ports of China. So much so that for a thousand years Indian manufactures were shipped for many miles in all directions, and especially to the coasts of Arabia.

India had colonies in Java, Sumatra, and Borneo. Her ships visited the ports of China and Japan. Her flag was well known in all the chief ports of Arabia and along the shores of Africa. In payment for the silks, jewels and spices which she poured into Europe through Arabia, gold was poured back again into all parts of India.

From the 4th to the 7th century A.D. the enterpris-

ing and fearless navigators of Bengal, with their headquarters at Tamralipti sailed boldly in an eastern direction looking for places where their sons could build new homes and develop new lands.

The ordinary necessaries of life were available to our ancestors at their very doors, because the soil was fertile and the all - powerful sun did all that was required in growing crops and ripening them. On the other hand, there were many commodities and manufactures of which India had more than she needed for herself, and these were exported to Europe and other places.



THE FIXED OAR, ROTATED BY A TILLER

The sheep of the North-West mountain ranges produced wonderful wool, and in those same mountains could be found precious stones such as lapis-lazuli, jasper, onyx, and chalcedony.

The forests produced a variety of gums from which sweet-scented incense, used in religious worship by Romans, Greeks and Indians alike, was manufactured. The wild animals of the jungle furnished the soft silky furs which were in great demand in cold countries. The embroidered woollen carpets of Kashmir and Indian woven coloured carpets were highly prized in the ancient capitals of the Assyrian and Roman empires. The silken goods of Dacca and other parts of India were exchanged for their weight in gold. Some of them were also exported as far as China. Cotton goods, canvases, calicoes and muslins of the finest texture were in great demand, as were brassware, salt and spices. The Tamil country traded in pearls, beryls and cotton. Its trading vessels carried these goods both east and west, and ships from the countries of the east and west visited the Tamil country. The result was a flourishing trade.

Now all this trade could not have been carried on without well-built sea-going vessels which could stand the rigours of the monsoon. The development and growth of these ships must now receive our attention.

The ships of the ancient Hindu period had from one to four masts, and each vessel was painted a different colour. The prows or fronts of the ships were carved to represent the heads of elephants, tigers, lions, birds, men and women, gods and goddesses. Ships of this nature can easily be recognised in the paintings in

Cave No. 2 at Ajanta, which must have been painted about A.D. 500. Another representation of ancient Indian ships can be found amongst the sculptures of Borobudur temple in Java. A famous art critic in describing one of these sculptures says, "The ship, magnificent in design, is a masterpiece. It tells more plainly than words the perils which the prince of Gujarat and his companions must have encountered in the long journey from the west coast of India to the shores of Java. The storms and cyclones have been successfully overcome. The crew of the ships are furling the sails and making all ready to anchor."

A famous historian has traced the existence of Indian sea-going merchantmen from the beginning of the seventh century before Christ, the ships sailing from ports on the south-west coast of India to Babylon, which was then the centre of the trading world. Ptolemy has given a detailed description of the Indian sea coast from the mouths of the Indus to those of the Ganges, and all ports of any commercial importance are mentioned. Those which are of special interest are Syrastra (Surat), Maisolia (Masulipatam) and Kounagara (Konarak). When the Chinese pilgrim Fa-Hien visited Tamralipti, in the fourth century A.D., he found it a busy and thriving seaport. It not only traded in cloth of a very fine texture, but was the starting place for many distinguished passengers on their way from India to its colonies.

Pliny, the ancient Roman writer, noted the demand for the precious stones of India, specially pearls and beryls, as well as the avidity with which spices from Southern India were bought. We read that when the wife of the Roman Emperor Nero died an enormous quantity of spices were strewn over her funeral pyre. Pliny also mentions the delight with which pepper and ginger were received in Rome. They were worth their weight in gold.

In Akbar's time we read that as many as 40,000 vessels of various sizes were employed in trading on the river Indus In the eleventh century Sultan Mahmud came into conflict with the Jats on his return from Somnath, and a great naval battle took place. Mahmud had ordered the building of 1400 boats. These boats were armed with three iron spikes, one projecting from the prow or front of the

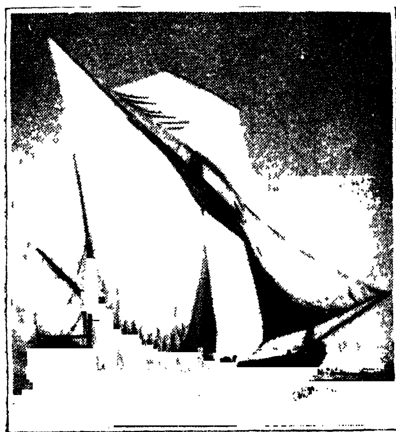


MARCO POLO

boat, and one on each side. This meant that any enemy ship coming in contact with one of Mahmud's would probably have its sides penetrated by these iron spikes, and would be destroyed. The Jats are reported to have had 4000 vessels, but although they put up a very brave fight they could not do much against Mahmud's ships which were armed in this effective manner.

Marco Polo tells us that during his stay in India he saw "ships of so large a size as to require a crew of 300 men." These ships could carry 6000 bags of pepper, which give us an idea of their size. They were moved by oars, each oar being pulled by four men.

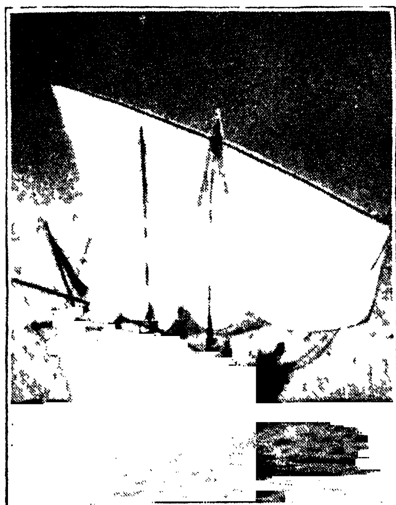
Nicolo Conti, another Italian traveller of the fifteenth century, says: "The Indians build ships much larger than ours. They have five sails and as many masts. They are so strong that they can withstand the tempests to which they are much exposed. Some of their ships are built in compartments, so that if one part of the boat is shattered, the other



A KOTIA BOAT

parts remain above water and can finish the journey." Thus we see that what is usually thought to be a modern idea is really a very old one.

Some ships from the west coast of India which used to trade in the Red Sea were 150 feet from stem to stern with a burden of 1200 tons. English ships of the period were of about 350 tons at the most. Tavernier, the French traveller of Mughal times, writes of Masulipatam : "This place is renowned on account of its anchorage which is the best in the Bay of Bengal. It is the place from which vessels sail for Pegu, Siam, Arakan, Bengal, Cochin, China, Mecca, and Hormuz, as also for the islands of Madagascar, Sumatra, and the Manillas."



A BAGLA BOAT

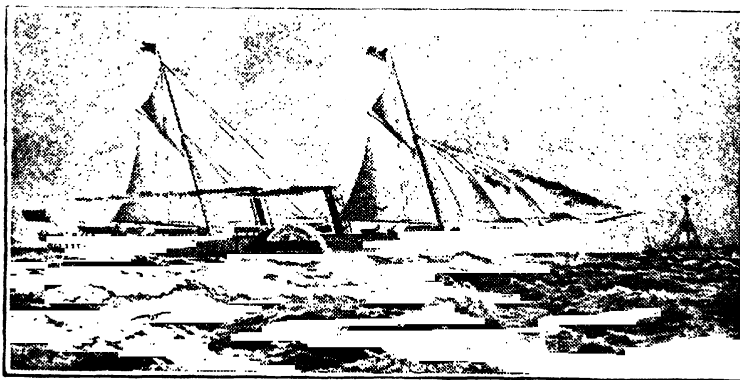
With the decline of the Mughal Empire, Indian shipping received a good deal of help from the English, although this is scarcely true of modern times. Dr. Radhakumud Mukherjea tells us that for nearly two centuries and a half

British India maintained a navy of admirable efficiency. A ship-building yard was started in Surat, but in 1735 it was transferred to Bombay, where a much larger yard was established. The man in charge of the Surat shipyard was a Parsee by the name of Lowji Nuserwanji, and he went to the new shipyard in Bombay His grandson followed him in this career, and soon they were building ships of 900 tons burden. These talented Parsee ship-builders supervised the construction of many ships for the Indian Navy. Although the East India Company wished to send out a European ship-builder, the very able work of Lowji Nuserwanji's grandson Jamsetjee was finally recognized, and he was permitted to retain his post. The man from England was not required.

Calcutta had its first dry dock in 1790. In 1803 Kidderpore dock was started and for many years the East India Company's vessels were constructed there.

The question now arises as to why shipbuilding was not developed in India on the same lines as in England. The P. & O. Steam Navigation Co., was busy building ships to run between Suez and Indian ports, and the S. S. *Hindustan* reached Indian shores in 1842. She was of 2000 tons. Subsequently larger ships were introduced. When the Suez Canal was opened it brought England and India much closer together, and the P. & O. steamers and vessels of other lines then came direct to India via the Canal.

Before the opening of the Suez Canal one had to travel all round the coast of Africa, that is, via the Cape of Good Hope, or else through the Mediterranean Sea to Alexandria, and then by camel across the desert to Suez, boarding a P. & O. vessel at that place. In any case travel by sea in those days was not at all pleasant. It was a very trying experience, specially when the weather was rough. In 1869 a certain passenger on his way to India crossed the Egyptian desert and embarked on the P & O 's *Nyanza* in Suez. It was a new cargo steamer of 1800 tons, which at that time was considered enormous. It accommodated 180 passengers. There was of course no ice or refrigeration in those days, or even tinned provisions. Therefore the ship had to carry livestock, such as sheep and goats and poultry in pens, etc. Cows were carried,



THE " NYANZA " PADDLE STEAMER, 1800 TONS

so that milk should be available for the children. The promenade deck was entirely taken up with cattle and poultry and the space for exercise was restricted. Owing to the great heat more than half the passengers slept on deck, ladies on one side and men on the other. There were no punkahs in the cabins ; oil lights swung from the ceilings. How different from the enjoyable journeys our fathers and brothers make nowadays when they go to England!

In course of time, the P. & O. met with competition, and as a result it had to improve the accommodation it offered its passengers.

It was not until early in the twentieth century that Indians had the idea of starting a steam navigation company of their own. Up to this time the competition between the various European-owned companies was so great that an Indian-owned line did not seem to have any chance whatsoever. However, by the enterprise and determination of some Indian commercial men, the Scindia Steam Navigation Company was started. Its vessels plied between Indian ports carrying large cargoes and some passengers. There would seem to be no reason why it should not develop its service and compete successfully with the other companies which have hitherto held the advantage. Let me tell you a few facts about this Indian enterprise.

It was the courage and determination of the

late Seth Narottam Morarji which enabled the Scindia Steam Navigation Co. to begin business in March 1919. The first steamer purchased was the S.S. *Loyalty*, which plied between Bombay and Genoa. In quick succession six modern cargo vessels were acquired and these were the forerunners of the twenty first-class steamers, with an aggregate tonnage of one lakh, which, by the time of the outbreak of the Second World War, were engaged in the coastal services of this Company. Later on two steamers were constructed to carry Haj pilgrims from various ports of India to Jeddah on the Arabian coast. These steamers were the S.S. *El Madina* and S.S. *El Hind.*



SETH NAROTTAM MORARJI

Now, all shipping lines take some pride in the formal launchings of their new vessels, and the Scindia Steam Navigation Company followed the old traditions. Most of the launching took place in

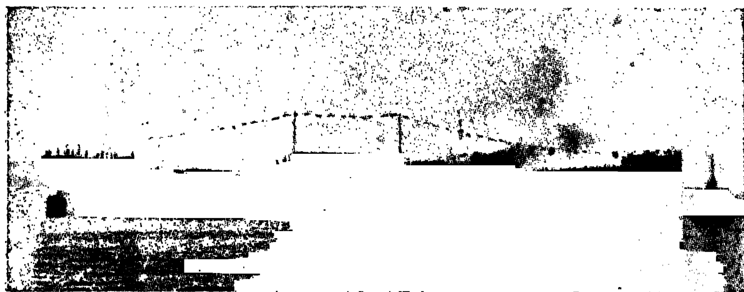
Glasgow, the ceremony always being performed by a leading Indian citizen.

It was due to the efforts of the Scindia Company that the Training Ship *Dufferin* was established in Bombay. There Indians are trained as officers and engineers for the Indian Mercantile Marine. Over 54 per cent of the cadets trained by the *Dufferin* have been absorbed by the Scindia line itself.

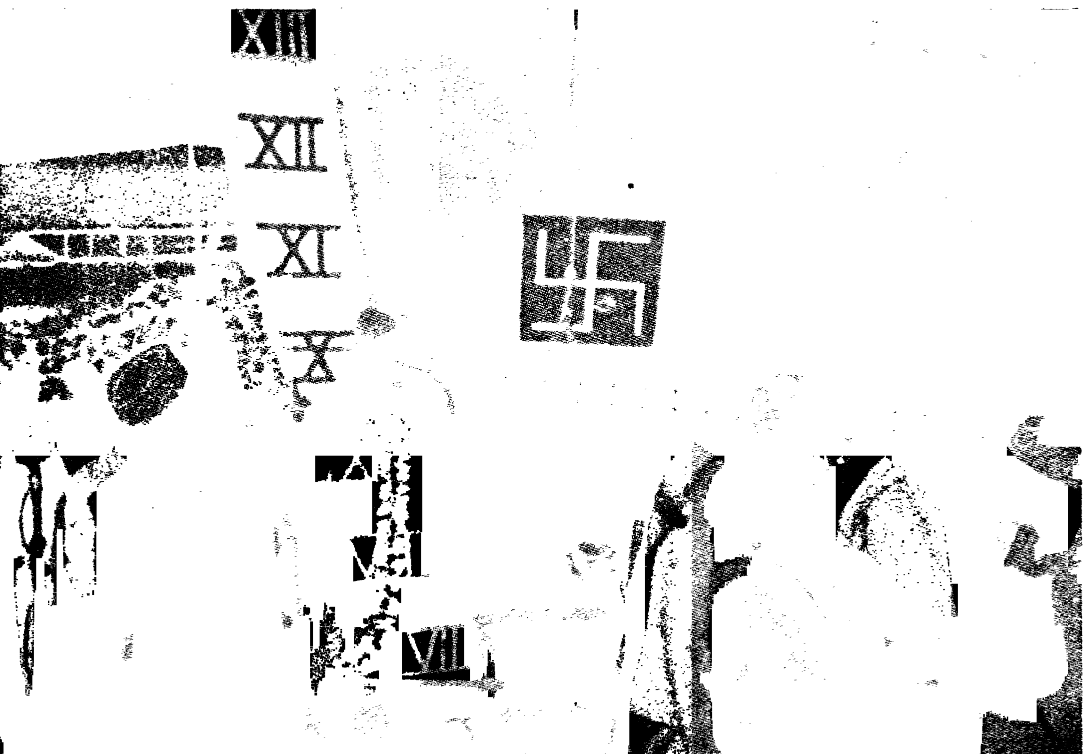
Now no steamship company of the size of this one can work satisfactorily unless it has its own shipyard for the building of new ships and the repair of old ones. After negotiations covering some years, a suitable site of 115,000 sq. ft. was found in Vizagapatam. The foundation-stone of the Vizagapatam Shipyard was laid on the 21st June, 1941 by Dr. Rajendra Prasad. After the ceremony Mrs. Sarojini Naidu said, " We read of Indian colonies of the past. In what ships did our men go to far off perilous corners of the earth, to distant China, to lands beyond the Pacific ? In what ships did those fine fabrics which the Princesses of Greece and Rome loved to wear go abroad ? In what ships were carried those tissues in which the mummies of Egypt were wrapped ? In what ships did the missionaries carry abroad Asoka's message ? Were they not all ships built by Indian hands to carry the glory of India to foreign lands ? Travellers and ambassadors that came here have narrated the storv of Indian

civilization in all its greatness and volume, not the least important part of which was her great national shipping. It was not a national venture merely, but it was a great international link between India and far off countries. The culture of the whole world has been harmonized in India ; for India took also from others and gave it back with a stamp all her own. In the new international life to be born, I hope that India will be able to send out her sons as ambassadors of a free country, and that they will go sailing in India's ships charged with the mission of maintaining international relations as well as the interchange of commerce."

The shipyard can build ocean-going vessels with a maximum length of 550 ft. and a maximum carrying capacity of 12,000 tons cargo. The yard contains hull shops, machine shops, a carpenter's shop, joiner's shop, blacksmith's shop, foundry and power-



S. S. JALA-USHA AFTER LAUNCHING




PANDIT NEHRU LAUNCHING THE "JALA USHA"

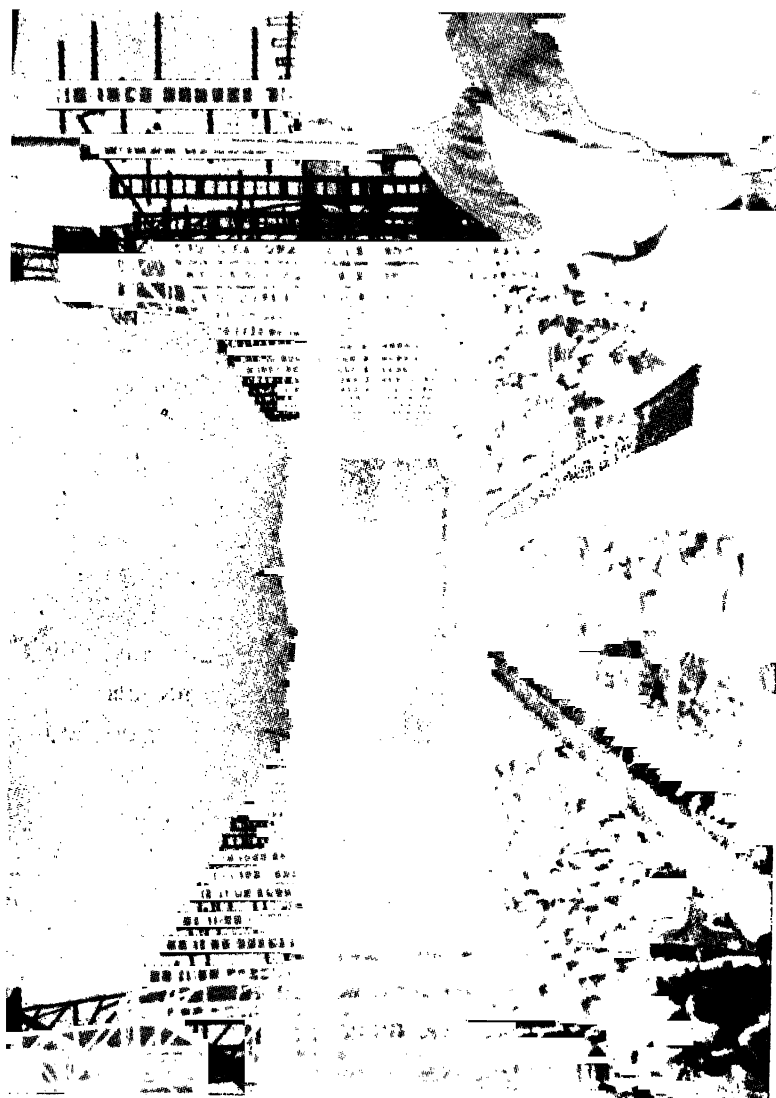
house, etc. Sufficient storage space is provided for different materials, *viz.*, timber, steel and general stores ; a railway siding runs right into the yard to facilitate transport of materials. Overlooking the entire yard, situated on a hill within the yard premises, are the main administrative offices, including an up-to-date and well-equipped Drawing Office.

Pandit Jawaharlal Nehru launched the *Jala-Usha*, India's first own-built ocean-going vessel on the 14th March, 1948. In the course of his speech he said " In launching this ship all manner of thoughts come to us, especially on such an occasion when it is the first Indian ship of this size that has been built and launched after centuries. Inevitably one thinks of the ages when ship-building was the premier industry in India.

" In this port of Vizagapatam we are not only building up this shipbuilding industry but also an important Naval Base. It being the most important port on the Eastern Coast of India I should like the Naval Base to develop and I should like our young men, bright young men, to join the Navy. Personally I would have liked to join the Navy myself had I been young."

It is hoped to build and launch at Vizagapatam three or four ships of from 8,000 to 10,000 tons each year.

The first vessel to be launched under this scheme



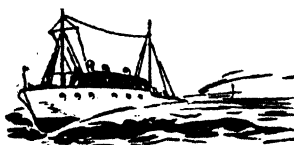
was the S.S. *Jal Prabha.* On that occasion the launching took place 1,000 miles away in the Capital by means of a push button. The Hon'ble Sardar Vallabh Bhai Patel, the Deputy Prime Minister of India, 'pushed the button' on the 20th November, 1948, whilst sitting in the Irwin Stadium, New Delhi. By this means the *Jal Prabha* was automatically launched at Vizagapatam by the automatic electro-mechanic circuit. Surely this is an age of wonders.

## QUESTIONS

1. Give a brief account of Indian shipping in ancient days.
2. Make a list of the places to which Indian vessels carried India's trade.
3. Describe the activities of the Scindia Steam Navigation Co., Ltd.

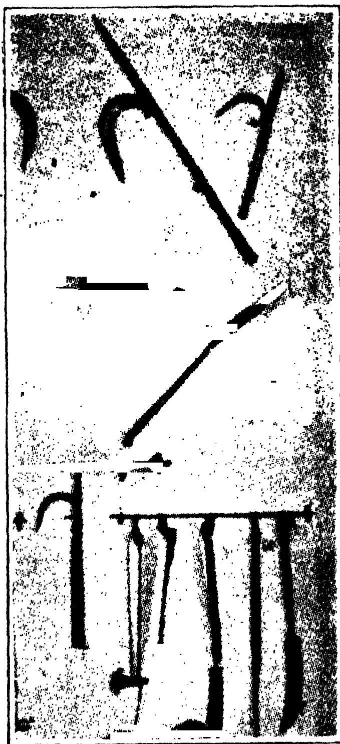
## NOTES

**navigation :** the act or art of navigating ; shipping generally.
**embroidered :** ornamented with designs in needlework.
**beryls :** semi-precious stones as gems or jewels ; they are of extreme hardness and generally green or greenish-blue.
**avidity :** greediness ; eagerness.
**livestock :** farm animals, such as horses, cattle, sheep.
**promenade :** a place for walking.



## OUR SOLDIERS—THEN AND NOW.

We all think of war as a terrible evil, for modern weapons and methods have made it a danger to civilization. It is a menace from which the world must one day be freed. Yet we all honour the soldier, as our ancestors did when they formed the warrior caste, for he risks his life to protect us when the conduct of another nation compels us to go to war.

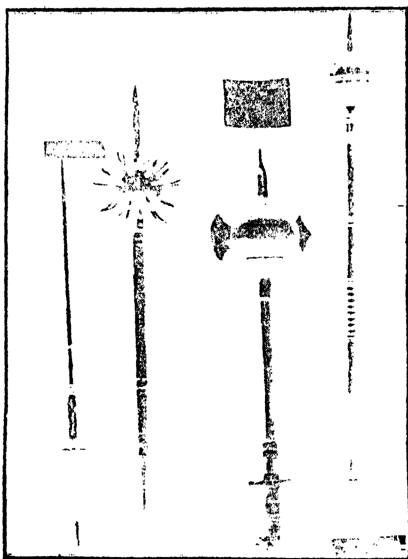


RAJPUT ARMS IN BIKANER FORT

The early history of India, like that of most other nations, is full of warfare—wars of new settlers against the aboriginal tribes, wars between rival princes, wars against invaders from outside the country.

After the struggles described in the early epics, one of the most famous battles in Indian history was that fought by King Porus and the Greek invader Alexander. Porus

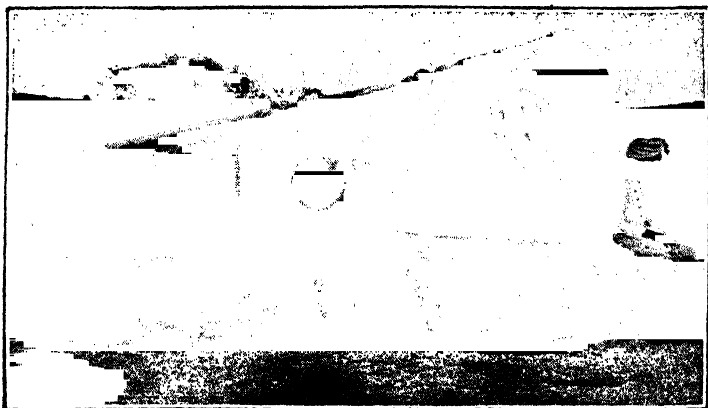
had in his army 250 elephants, 30,000 foot soldiers, 150 chariots and 2,000 horse soldiers. Against him was arrayed Alexander's well-drilled army. Porus put up a magnificent fight. It was only when his elephant lost its bearings that the army of Porus was thrown in disorder and the Greeks took full advantage of the situation. Alexander was so pleased at the way Porus had defended his country that he gave him back his sword and his kingdom.



MACES AND BATTLE AXES
*(Loan Collection of Antiquities.)*

From that time onwards we read of war after war, sometimes Hindu kings against Muhammedan kings.

The most ancient weapons were the bow and arrow. The bows were made from tough grass, hemp, bamboo, and other materials. Arrows were made of iron or bamboo. Other weapons which gradually came into use were heavy clubs, spears, javelins, battle-axes, daggers, boomerangs, the trident, and hand guns or muskets.



BIJAPUR GUN

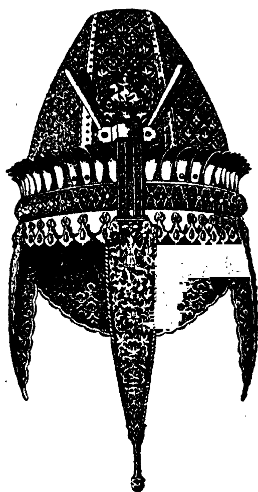
Other weapons for killing elephants and horses and breaking down the doors of forts, etc., were also in use.

In the time of the Mughals big guns were cast in foundries and used with much success. One of the famous guns cast in India is the Malik-i-Maidan, which stands on one of the bastions of the Bijapur Fort. It is short and thick and with a calibre very much out of proportion to its length, which is 14 feet 4 inches. It was cast in 1594 by the gunsmith Muhammad Bin Hassan Rumu. Other guns are to be found in Daulatabad including one which is in the shape of a ram's head. There is also the well-known gun Zam Zamah which can be seen at Lahore.

Both the ancients and the Mughals wore armour,

that is a coat of mail, helmet and arm-guards made of iron or steel. Varuna, however, is mentioned as wearing a suit of golden armour.

In ancient times chariots were used. Originally the warrior was his own charioteer, but later on a chariot driver was introduced, leaving the warrior free to do his fighting without having to control the chariot. A charioteer's chief duty was to drive the chariot and to shield his master from attack. Chariots were of three kinds—two-wheeled, four-wheeled, and eight-wheeled,—and each chariot was accompanied by ten or more elephants. In some cases the chariot was drawn by oxen, especially when on the line of march, but when in battle the oxen were generally exchanged for horses. Each chariot carried its own flag or banner.



A BEAUTIFUL IRON HEADPIECE FROM AN ANCIENT INDIAN SUIT OF ARMOUR

After chariots the next important part of an army were the elephants. As you will readily realise, these elephants had to be very well trained. The overseer of elephants had to see that the rations supplied to elephants were properly allocated He also had to check the work of the mahouts. All sick

and wounded elephants had to be treated by the veterinary surgeon. The overseer had to pay wages to all those employed in the elephant stables. He had to superintend the washing of the animals morning and evening. They had to be watered every afternoon after their daily exercise.

Writing about Porus's elephant in his battle with Alexander, the Greek historian Plutarch says : "The



RAM-HEADED GUN IN DAULATABAD FORT

elephant of Porus kept charging the ranks of the enemy until the mahout, seeing the king was very badly wounded, turned the beast round and fled. At some distance the mahout made the elephant kneel down so that Porus could get down from the elephant. Alexander, thinking that Porus was dead, ordered his body to be removed, but the elephant turned in defence of his master and lifted him up again, and placed him

on its back once more." This shows you how faithful these huge beasts can be. Only the most intelligent of the elephants were used by the kings and princes when fighting. These noble animals were kept apart in the royal stables.

Here is another story about fighting elephants. A certain king mounted his state elephant and led an attack on the city of Benares. The soldiers defending the city discharged showers of arrows against the attackers and this frightened the king's elephant. The mahout, however, addressed the elephant as follows : "My son, you are a hero and are quite at home in the battle-field. To turn round now and flee would be most disgraceful." So recovering his courage, the elephant rushed against the gate of the city with all its force and fury, broke it into pieces and entered the city amidst shouts of victory.

The greatest attention was paid to the horse soldiers or cavalry. The cavalry man was generally



JAMADAR GAJE GHALE, V.C.

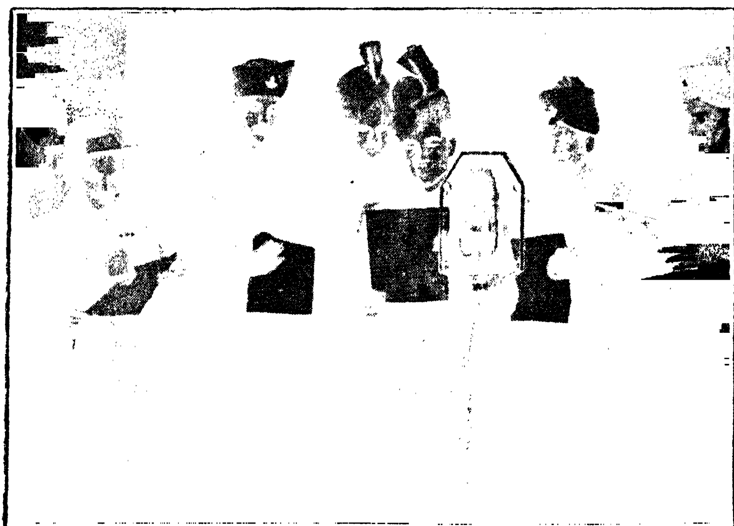
armed with a spear or sword. His chest was covered with armour. The cavalry was largely reponsible for the safety and security of the army when in an entrenched position or in camps. It was also ordered to interfere as much as possible with the supplies and reinforcements of the enemy.

Foot soldiers carried bows and arrows and javelins. Those who carried swords wielded them with both hands in a close fight. The *Agni Purana* says that victory always attends the army which has the largest number of foot soldiers. This holds good even to the present day !



ON THE ARAKAN FRONT

*Men of a Rajput Regiment receive final instructions before going on patrol.*



INDIAN SOLDIERS SENDING MESSAGES HOME OVER THE WIRELESS FROM ITALY

With the decline of the Mughal empire and the advance of the East India Company, we find the latter employing a large number of Indian soldiers to defend their settlements and goods.

During the last hundred years the Indian Army has changed very considerably. It covered itself with glory during the World War of 1914-1918, and afterwards underwent a thorough modernization. The various actions of our Army during the Second World War have earned for it the admiration of the entire world, and decorations for gallantry, from the Victoria Cross down to the humblest awards, have been obtained in very large numbers. The achievements

of the Indian Army in Abyssinia, Egypt, Tunisia, Italy, and Burma were amazing feats of military skill and courage. The adventures of Indian Officers and men read like the epics of old, and even the heroes of ancient times knew nothing like the dangers which these men had to face daily.

As long as a soldier has brains and ambition there is nothing to stop him rising to the top of the ladder. But "he who aspires to give commands must first learn to take them."

The training of character and the development of a proper sense of discipline must always play their part



SEPOY KAMAL RAM, V.C.



A PUNJABI HAVILDAR CHECKS OVER A JAP SWORD

in the making of a soldier. Training may seem difficult to the recruit, but he will soon derive pleasure from increased physical and mental fitness. A newcomer to the officers' training school finds himself in the company of men from school, college and university, all speaking different languages except for one common language, English. The first days are likely to be confused ones, but a cadet soon makes heaps of friends and quickly settles down.

The training consists mainly of drill, learning the use of weapons, physical training and simple field craft. After a month of such training the majority of cadets are usually very fit physically. As the training

progresses it becomes more and more interesting and includes the driving and maintenance of motor cars and lorries, the management of animals, and field tactics. This training is generally carried out in wide open valleys, forests and hills. How enjoyable it is after hours of hard work in the open air, to sit round a camp fire and enjoy a hot meal! It has only to be experienced to be appreciated. On such occasions the mysteries of desert and jungle warfare are fully explained to the cadets. During their training they learn map reading which will enable them to guide their men across strange country without making mistakes.



HAVILDAR TAL BAHADUR PUN, V.C.
WITH HIS WIFE, FATHER AND MOTHER

This is all excellent training, of great value in the future career of an Indian Army officer. The qualities of initiative, endurance and leadership will give him preference when men are required to fill posts of importance.

Life is not all parades and work. The cadets can find plenty of time for sports and other amenities including billiards, concerts, and cinema shows where English and Indian films are shown.

In due course the trained cadets receive their well-earned commissions. These young men are only too eager to prove their qualities of leadership. They are physically sound and mentally equipped to carry on the magnificent traditions of the Indian Army.

India stands second in the number of V. C.s awarded during the last war. Thirty-one fighting men received this coveted medal.

Two years after Independence Day, 1947, most of our generals and officers are Indians. The Commander-in-Chief of the whole army is also a son of the soil. New military Training Colleges have been started and large numbers of our young men are learning the art of soldiering. We want a large army able to defend our land against any aggressor.

There are many branches of the Indian Army and officers are needed for all of them. If you like mathematics, then your best choice will be the Indian Artillery. If you have a knowledge of electricity or

machinery the Indian Electrical Mechanical Enginneers will be glad to welcome you. Tanks, armoured cars, wireless telegraphy, despatch riding, signals, the Supply and Transport Corps, the Ordnance Corps, and the Infantry, which is the backbone of the Army, all offer fine opportunities to men of the right type. Which branch of the service is likely to claim *you* ?

## QUESTIONS

1. Write in your own words the story of Porus and Alexander.

2. (a) What were the main branches of the army in ancient days ?

   (b) What are they in modern times ?

3. If you wished to become a soldier, which branch of the army would you join ? Give your reasons.

## NOTES

**javelin** : a light spear for throwing.

**boomerang:** a large piece of wood which, when thrown with skill, returns to the owner ; something which bounces back again.

**trident** : a three-pronged spear.

**bastions** : part of a fortification.

**calibre** : the bore of a gun ; its interior diameter.

**armour** : a defensive dress of iron or steel which used to be worn by fighting men.

**coat of mail** : same as above.

**allocated** : to give each its place or share.

**reinforcements** : additional soldiers sent to strengthen an army.

**cadets** : students in a military school.

**tactics** : the science and art of using military forces.

**initiative** : that which begins or sets on foot.

# OUR SAILORS—THEN AND NOW.

As three-fourths of India's frontiers consist of open sea-coast it is only natural that our ancestors should always have tried to maintain a number of ships to keep a look out for invaders. The intrepid sailors of Tamralipti had many ships which sailed hundreds of miles to the east in search of colonies. The brave Tamil seamen sailed hundreds of miles to the north in search of invaders and avenues of trade. The sea-kings of the Punjab repaired their fleets on the banks of the Indus and sailed far out to sea in order to safeguard their possessions. The Mughals, as you have read in the lesson on Shipping, maintained large fleets of vessels.

After the decline of the Mughals the East India Company built an Indian Navy which gave good service. It dates back to the year 1612, and the Royal Indian Navy is its successor.

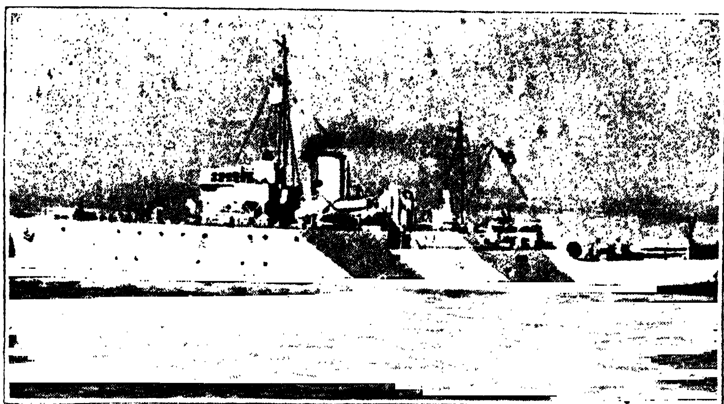
As has already been mentioned, the old Navy's ships were built in Surat and Bombay by the Parsee shipwright Nuserwanji and his descendants. The ships built in Bombay were strong, handsome, and as well finished as ships built in any part of Europe. In one hundred years no fewer than 115 men-of-war and 144 merchant vessels were built in the Bombay Dockyard.

You may not know that the Navy always ranks as

the senior service either here or in any other part of the world, and it accepts only the very best in the way of ships, men, guns, ammunition, and organization. The Second World War brought about a tremendous increase in naval power in India. In ships and men the Royal Indian Navy is now twenty times as strong as in September, 1939. Many vessels have been built in Indian ship-building yards and launched by princes, governors and citizens. There can be no gainsaying the fact that our mother country will never be safe from attack from the sea,



BUILDING A NAVAL VESSEL IN AN INDIAN SHIP-YARD IT IS BUILT ENTIRELY OF INDIAN STEEL



H.M.I.S. "POONA"

and cannot guarantee a safe passage for her merchant ships to and from her shores, unless she has a powerful Navy. In the defence of India against possible foes the Navy comes first.

However small the unit or ship may be, it has to be self-contained, that is, the crew must include men from all branches of the Navy. There must be navigators and seamen, there must be gunners, wireless operators, telegraphists, engineers, carpenters, workers in iron and steel ; and all must co-operate closely with each other in order to reach the perfect efficiency which is required at sea, especially in war-time.

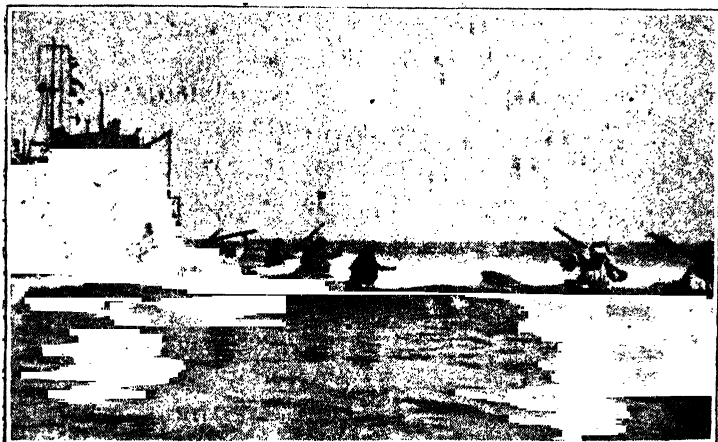
Any Indian youth who has passed his Matriculation or High School Examination is eligible for entry into the Royal Indian Navy. A knowledge of English is essential. Such youths become midshipmen, and

rise to be Sub-Lieutenants, Lieutenants or to higher rank. Those proficient in mathematics are given preference.

Before becoming a midshipman a youth has to be trained in one of the naval establishments on shore. It may surprise some of you to know that no fewer than sixteen training establishments of the Royal Navy have been opened since the year 1939. The Royal Indian Landing Craft Wing trains crews for landing-craft as well as beach-parties.

As in the Army, so in the Navy, discipline is essential. The period which follows training determines to a large extent one's position in the future. All officers have to have a thorough grasp of their work before taking over their responsibilities.

Now it is all very well to be a member of a University Rowing Club and be able to handle your college boat skilfully—it is quite a different thing from the handling of naval boats under the control of oars, sails or power. It is most essential to know mechanics and dynamics as applied to the lifting of heavy weights, and the ordinary rules of the road when at sea to prevent a collision with another ship. One also has to have besides an elementary knowledge of astronomy, trigonometry, meteorology and the handling of the compasses and other instruments of navigation. Then one has to have practice in sea and aerial combat, that is, a knowledge of, and practice with, the different



LANDING CRAFT

weapons used in naval gunnery at sea, and against aeroplanes in the skies above. Unless one has all these things at one's finger's ends there is not much chance of progress up the ladder of promotion.

The Royal Indian Navy consists of men from all parts of India. They are all proud to be in the senior service. The Royal Indian Navy offers the right man education, travel, adventures, and an active and interesting career.

Just think of the skill and nerve an officer of the Royal Indian Navy must have when he is entrusted with a huge floating fort of iron and steel, built at colossal cost to drive away invaders from India's shores, and carrying a large number of Indian sailors whose lives are committed to his care. He has to be

so expert in all branches of naval work and duty that his ship must come to no harm and not a single life committed to his care must be lost through any fault of his. A tremendous responsibility indeed, but it should not frighten one. It is a task which is being performed year in and year out by a large number of India's sons who, whatever else they call themselves are now definitely " Sons of the Sea."

In one year alone the ships of the Royal Indian Navy steamed over 1,750,000 miles. Many strange duties came their way, and they kept up the highest traditions of the service. H.M.I.S. *Bihar*, only a small vessel, rescued 191 survivors from a sunken merchant



GUNNERY PRACTICE AT SEA



SHIPMATES ON THE H.M.I.S. "JUMNA"

ship at night. The survivors were made as comfortable as possible. The officers and men gave up their cabins and bunks so that the women, children and aged people might rest.

Another example of the spirit of the Royal Indian Navy was the fight of H.M.I.S. *Bengal* in the lonely spaces of the Indian Ocean, a thousand miles south-west of Java.

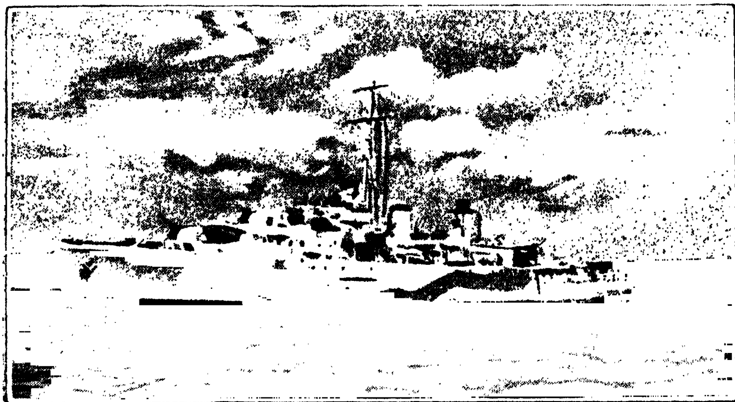
The *Bengal* is a 1,000 ton vessel with a single 12-pounder gun. On November 11th, 1942, she was escorting the 6,000 ton motor tanker *Ondina*, when two Japanese raiders came in sight. They were heavily armed merchantmen of 10,000 and 6,000 tons, each

with six 5.5 inch guns, that is, twelve guns firing shells six times the weight of the *Bengal's* 12-pounder.

Against such odds only extreme courage could avail. Increasing to full speed, the *Bengal* engaged the enemy as closely as possible. She twisted and turned with the greatest skill, and kept up her fire with such good effect that she scored a hit on the big raider's ammunition magazine.

With great courage the captain of the *Ondina* had chosen to accompany the *Bengal* rather than seek safety as he might have done. He was killed early in the fight, and all the *Ondina's* ammunition was used up, so the crew abandoned the ship. The *Bengal* fought on.

Suddenly the big raider blew up and sank. Her companion closed in to pick up the survivors. There-



H.M.I.S. "NARBADA"



THE GUN CREW OF THE "BENGAL"

upon the *Bengal* put up a smoke screen and drew of; she had hardly any ammunition left.

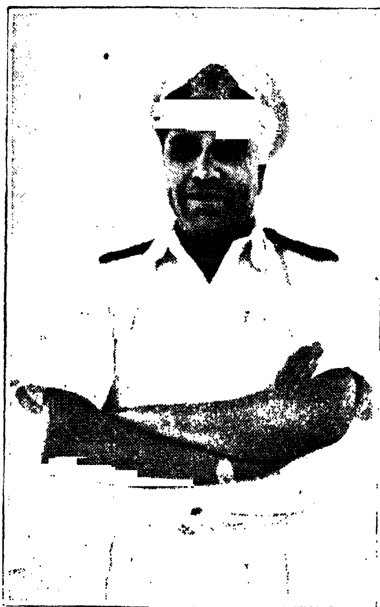
The *Ondina* was not as badly damaged as the crew had imagined, and now that help was at hand they returned to the vessel and managed to get her under way. So the *Bengal* and the *Ondina* limped across the Indian Ocean, feeling they had done a good morning's work.

Rousing receptions greeted them at Colombo and Bombay.

Whilst the bigger ships of the Royal Indian Navy were engaged in the protection of shipping and coasts, the smaller ships, the R.I.N. coastal vessels, carried the fight to the enemy by bombarding the west coast

of Burma. The little ships had to face shelling by the enemy's shore batteries and attacks by enemy aircraft. So skilful, however, was the handling of these vessels that practically no damage was suffered by them in all these attacks.

From the time the Mercantile Marine Training Ship *Dufferin* was instituted in 1927 and up to December 1944, 719 cadets had joined the ship for training for a sea career. A large number of them are employed in various capacities in the R.I.N and the Merchant Navy, and are now actively serving the country both afloat and ashore. Commander Sadashiv Ganesh Karmarkar, M.B.E., R.I.N.R., whose home is in Poona, received his first sea training in the *Dufferin*. He joined the Royal Indian Navy in November, 1939. In the following year he was in command of H.M.I.S. *Ratnagiri* in the Red Sea, having



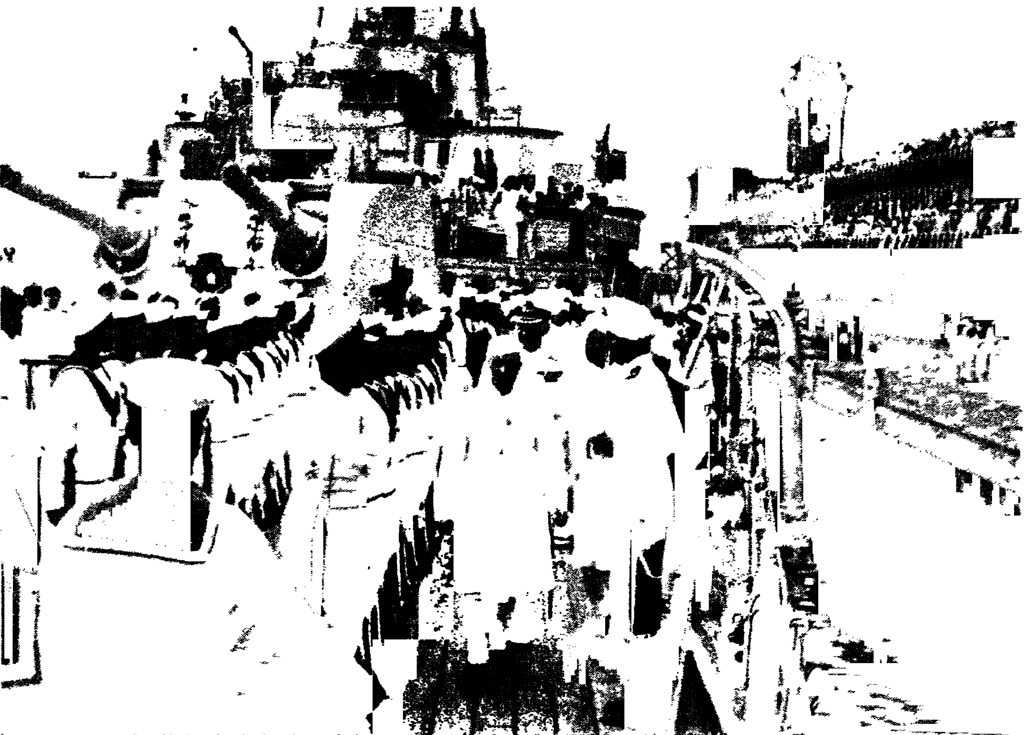
COMMANDER S. G. KARMARKAR

escorted a large convoy of troops for the Middle East on the outward journey.

When Massawa fell, *Ratnagiri* swept the approach channels for enemy mines. Later she carried Mahratta troops to occupy islands off the port and round up many hundreds of Italians and Germans. For his services in this campaign Commander Karmarkar was awarded the M.B.E.

Some of the provinces of our country have adopted warships. This means that they provide the men of their adopted warship with extra comforts and maintain contact with them by frequent correspondence. Bonds of friendship have been formed between the sailors and their provincial friends. Parties of naval officers and men are organized to visit the province which has adopted their warship. Thus interest in the Royal Indian Navy has been stimulated even in places remote from the sea, and this interest must continue because, as we have pointed out above, India's coasts must be continually guarded and only our warships and other naval vessels can do this satisfactorily.

Since Independence Day 1947, the Royal Indian Navy has been expanded enormously. Only a few months ago India's first Cruiser, the H.M.I.S. "Delhi" arrived at Bombay and was received by Pandit Jawaharlal Nehru, our Prime Minister. It has six 6-inch guns, eight 4-inch anti-aircraft guns, four



PANDIT JAWAHARLAL NEHRU ON BOARD THE H. M. I. S. 'DELHI'

3-pounders, ten smaller guns, eight 21-inch torpedo tubes and a speed of 32.5 knots per hour. It carries 43 officers and warrant officers and 720 seamen.

In 1949 three Destroyers are expected to be added to the Indian Navy. Another addition to our Navy is a Tank landing ship capable of carrying large number of tanks, vehicles and men, and landing them direct on beaches.

What are the chances of your becoming a sailor? Would you like to try? It is quite possible you may become an Admiral of the Royal Indian Navy! Who knows?

## QUESTIONS

1. What means existed in ancient times for the safeguarding of India's shores?
2. Why is a Navy so essential for the safety of our country?
3. Write a short account of what the Royal Indian Navy offers to a youth wishing to join it.

## NOTES

**intrepid :** brave ; fearless ; daring.

**no gainsaying :** no denial ; cannot be contradicted.

**landing crafts :** boat propelled by machines or oars and used to land soldiers or sailors on the shores of the country being attacked.

**stimulated :** aroused to activity ; spurred on.

## OUR AIRMEN

When we wish to read about flying and the feats of our airmen, we cannot go back to ancient times as we have done in other lessons. Flying in India did not start till 1910.

During the First World War a number of our countrymen joined the Royal Flying Corps, but it was not till 1932 that the first steps were taken towards the formation of the Indian Air Force. A few enthusiasts, who had vision and courage, worked on the scheme ; others were full of doubts. All the foresight and judgment of the original committee who visualised the Indian Air Force would have been of no avail had they not been able to call upon the services of six young men. Their names were Sirkar, Mukherjee, Upendra Singh, Awan, Amaresh Singh and Tandon. These six young men left their homes and went to England to start learning about flying. They did not realise, however, that they were laying the foundations of a new Air Force whose headquarters would be in India. These six candidates were sportsmen. Their achievements at the training centre were outstanding, and they soon had their certificates. Other candidates from India followed.

When they had all returned to India they were posted to No. 1 Squadron of the Royal Air Force, and they gained experience in hard training and opera-

tions on the North West Frontier. On the 1st of October, 1933 the Indian Air Force was started with one Flight at Karachi. It was intended that it should be officered and manned by Indians. Those who had the courage to back this idea have been amply rewarded. It has been proved that Indian airmen, pilots as well as ground crews, are just as adventurous and brave and expert as those of any other nation, as can be readily seen from their achievements in Burma.

Full use was made of the Royal Indian Air Force, as it is now called, in fighting against the enemy in Burma and its pilots earned honour and glory.



KOHIMA VILLAGE

Operating from the most up-to-date air fields on the Burma-Assam front, the R.I.A.F. squadrons distinguished themselves in the Kohima and Imphal areas. Their support of the land services in the defence of those places was invaluable. It was Indian pilots who covered the attack of the 14th Army tanks when they first went into action. Other squadrons were engaged in taking photographs of the enemy's positions, movements, hide-outs and gun emplacements. This is most valuable work, and unless the directors of operations have such photographs their task is a hopeless one, In one day a squadron took 250 photographs and within 24 hours the photographic section had made 1500 prints for study by Army Commanders and Intelligence Officers.



A SQUADRON OF BOMBERS



ACTING PILOT OFFICER A. K. B. CHOUDHURI OF RANCHI BEING COMPLIMENTED BY THE COMMANDER-IN-CHIEF AT THE FLYING TRAINING SCHOOL, AMBALA

During the operational season, that is, the months when the monsoon was not raging, the R.I.A.F. squadrons made 7,600 sorties and dropped more than 1000 tons of bombs. This wonderful record is due not only to the great ability and courage of the pilots concerned, but to the very high standard of service maintained by the hard-working ground crews. As you probably know, aeroplanes have to be kept in perfect working order. It is the pilots who fly the planes, but the ground crews keep the machines ready. The tanks must be kept filled with petrol, the guns have to have fresh ammunition, there must be a new supply of

bombs and every part of the elaborate machine must be made ready for its deadly work.

Not only did the R.I.A.F. squadrons help to thrash the enemy in Burma, but many squadrons were daily employed in watching the North-West Frontier, a very important task with which they were entrusted. The policing of the Frontier was very good practice for the squadrons which later had to face service conditions in Burma and other countries.

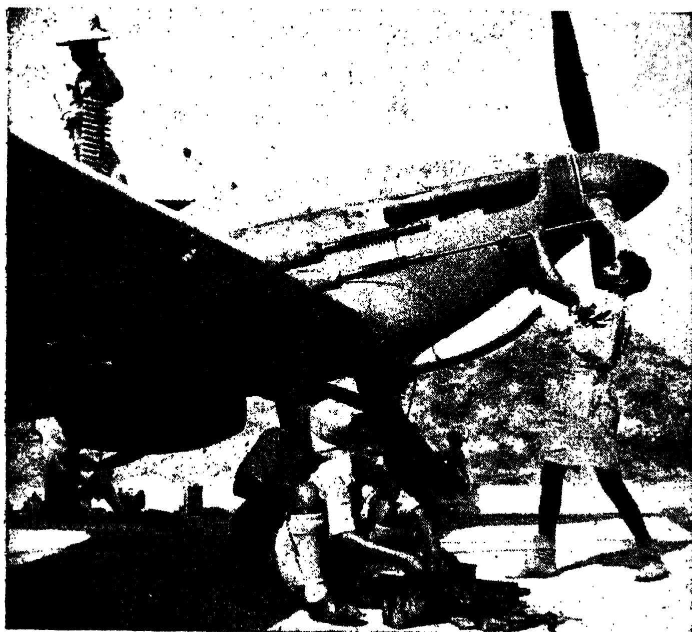


FLYING OFFICER S. E. SUKTHANKER, D.F.C.

Many high distinctions have been awarded to our pilots for their courage and skill. During the last European War, when the Germans were trying to smash Eng-

land, it is now generally known that there were forty Indian pilots in the R.A.F. helping to guard English skies. Most of those Indian pilots are now back in India in the Royal Indian Air Force. Many of them have seen service in Burma. One of them, a young Mahratta Brahman, Flight-Lieutenant S. E. Sukthanker, was awarded the Distinguished Flying Cross for leading raids over Berlin, Hamburg, Bremen, Munich, Turin, Genoa and other places.

Thousands of our fellow-countrymen have been



GROUND CREW CLEANING AND RELOADING THE CANNON

recruited for ground work. The training of Indian flight-mechanics has made a rapid advance. Improved methods have been applied in fitting non-commissioned officers for leadership and technical management. The Indian Air Training Corps, which was started in 1943, is now active in nine Universities. They find suitable candidates for the general branch of the R.I.A.F. Any student who wishes to join is given a three months' course in technical and non-technical Air Force subjects. Flights are arranged, so that the candidates can test their reactions to actual flying.

Of course it is one thing to read books of adventures about flying but quite another matter to be in the air. As you probably know aeroplanes sometimes get into air-pockets which make the planes bump and jump about. One goes through an air-pocket very quickly, and most youths much enjoy this. It is one of the thrills of flying. Others of a nervous temperament are upset and wish they were safely on the land once more. It should be thoroughly



WING-COMMANDER K. MAJUMDAR

understood that you can have an enjoyable life in the Air Force and never leave the ground. You get plenty of work to do if you are a member of the ground staff.

Many of our flyers have become officers holding high rank. Among them was Wing-Commander Karun Majumdar, who unhappily met with a fatal accident whilst flying. He was engaged in aerobatics, that is, doing rounds and turns and somersaults with his machine in the air. A huge crowd below was watching his feats. Nobody on that Saturday morning in Lahore dreamed that the experienced Wing-Commander would have any trouble with his machine. But the least expected sometimes happens. He made his plane show its paces, rolling and turning in a way that gave a thrill to all the spectators. The hum of the machine filled the air. The third roll was just beginning when there was suddenly a crash and there was nothing to be seen but the twisted mass of wreckage in the middle of the field. Inside the shattered machine lay one of India's greatest pilots, only thirty-two years old, who had helped to make the R.I.A.F. what it is to-day. He was an ideal leader and a hero to his men. He proved that Indians could work together for a common purpose, and be as efficient in fighting as other airmen in this world.

Since our country is now independent it is more

necessary than ever that our young men in their thousands should come forward for training as pilots and airmen.

India has an unlimited number of aeroplanes, as well as first class training centres, where men are given a thorough instruction in the art of flying. If you are fit and young, if you are keen to get on, if you have an honest desire to work hard and, finally, if you really want to fly, then there is an honourable place for you in the Royal Indian Air Force and an assured position for you in the future of India. If you will put your heart into the job of finishing the great work which has been so ably started by your fellow-countrymen, you will be well repaid by your own success.

## QUESTIONS

1. Write a short essay on the Royal Indian Air Force.
2. What are the duties of the ground crews ?
3. Which would you prefer—to fly aeroplanes or maintain them on the ground ?

## NOTES

**enthusiasts :** those who are very zealous and intensely eager to support anything.

**visualise :** to make a mental image or picture of anything.

**squadron :** a detachment of Air Force, usually consisting of nine aeroplanes.

**policing :** affording protection to ; keeping order.

**nervous temperament :** highly sensitive ; impressionable.

**shattered :** broken ; dashed to pieces ; wrecked.